

SMOKELESS AIR

THE SMOKE ABATEMENT JOURNAL

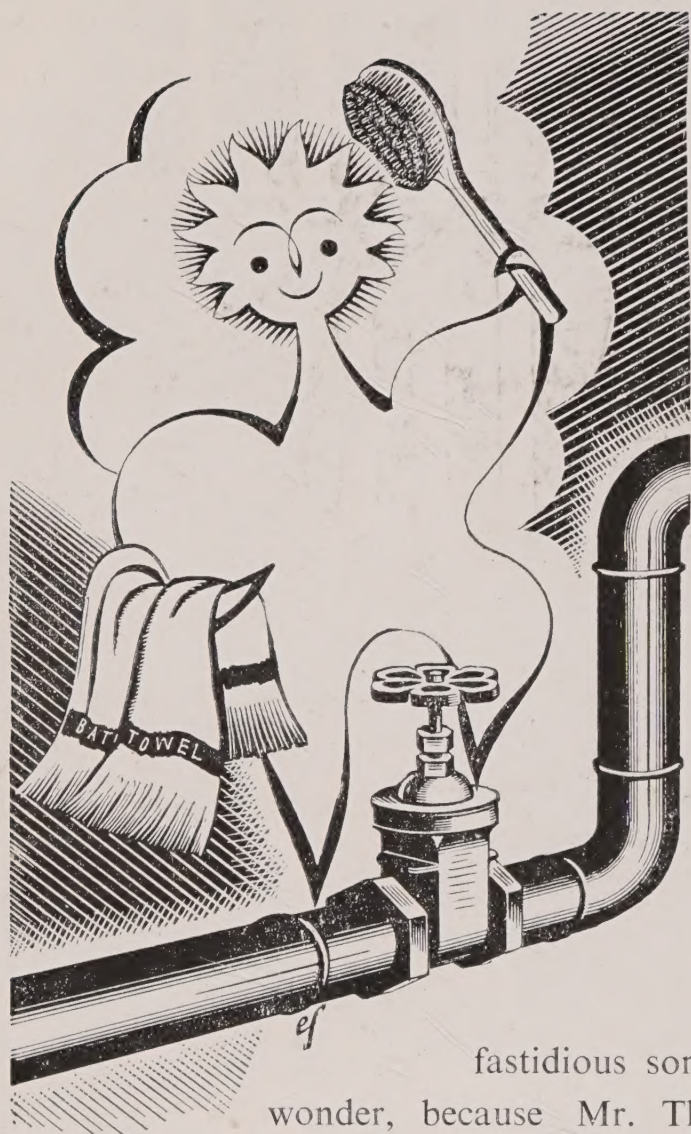


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ONE SHILLING

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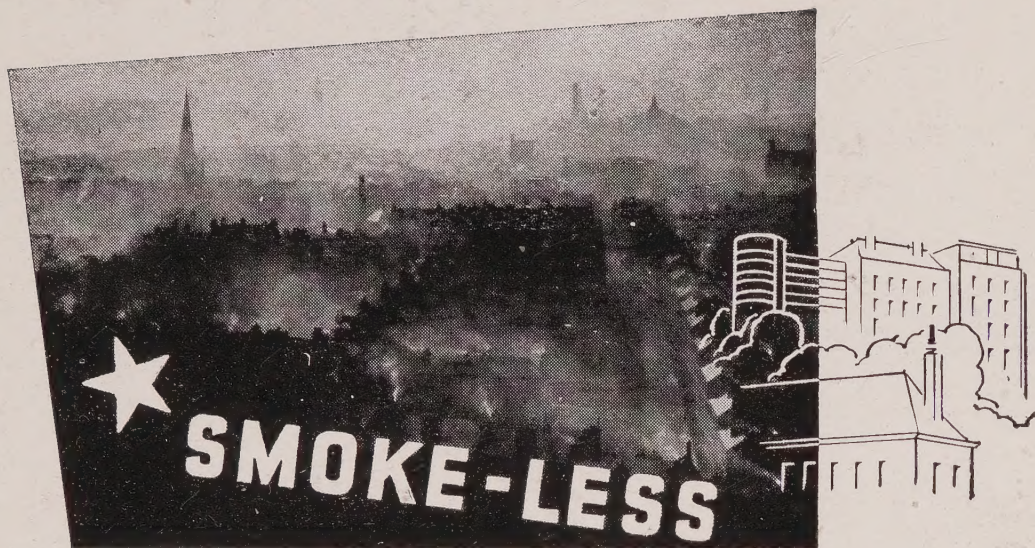
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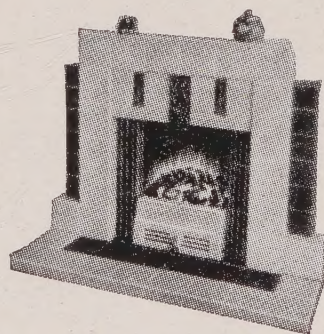


OPEN FIRES

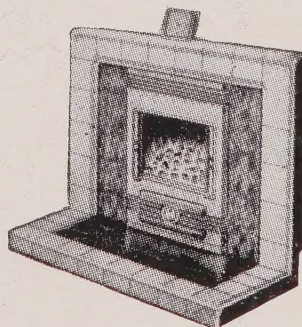
FOR SMOKE-FREE CITIES

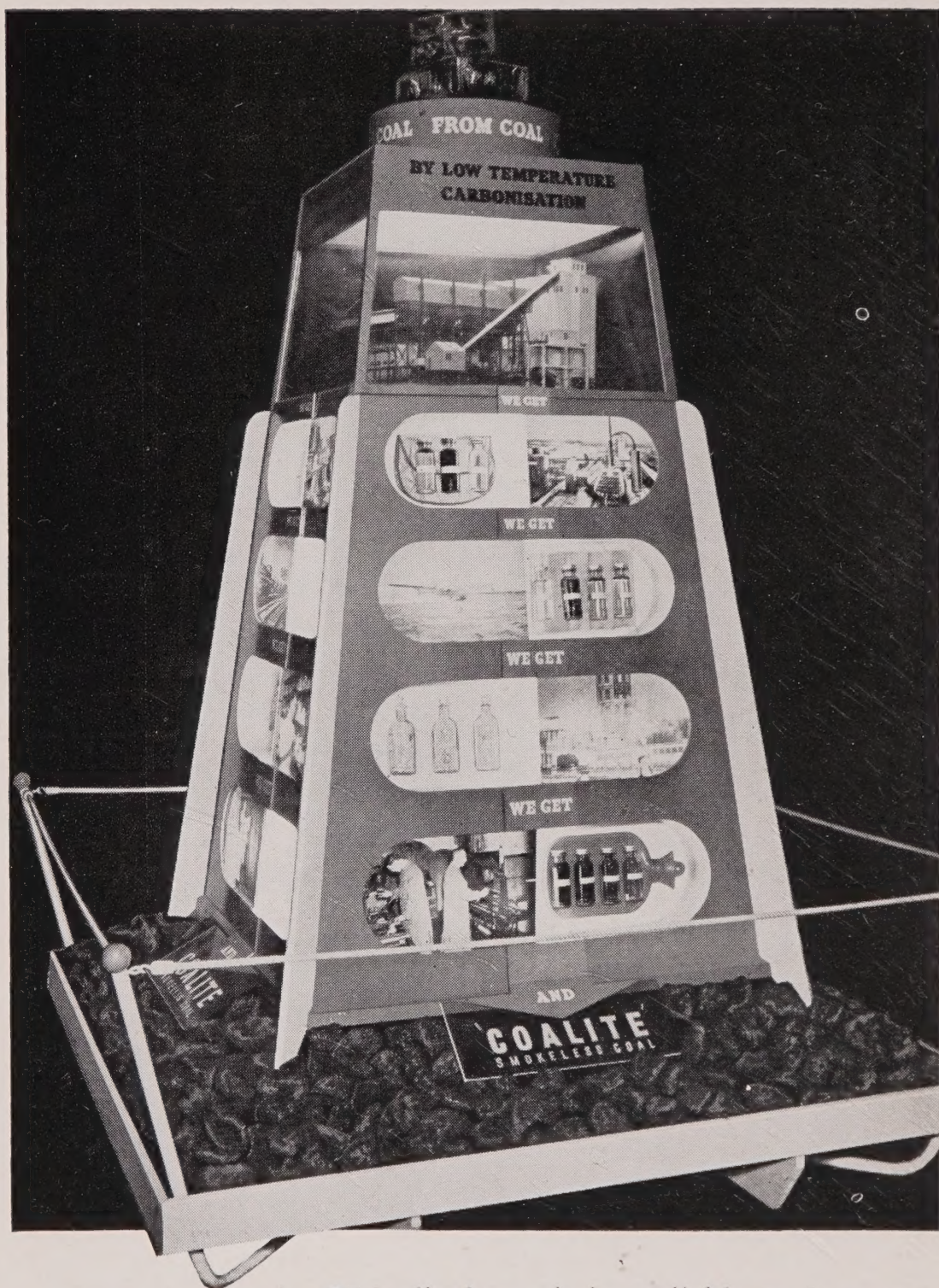
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OFFICIAL NOTICES TO MEMBERS

Amendment to Constitution

At a Special General Meeting held in Brighton on 24th October, 1946, the following resolution was adopted :

That Clause 16 (b) of the Constitution be so amended that it shall read as follows : *Vice-Presidents*. Nominations for Vice-Presidents may be made by any Member or Representative of a Member, provided that the Executive Council are satisfied that the persons nominated are eligible under Clause 14(a) hereof, and shall be received by the General Secretary not less than six weeks before the date of the Annual General Meeting. In the event of more than twenty nominations being received a postal ballot for the election of twenty Vice-Presidents shall be held under the same procedure as that prescribed for the election of President and Honorary Treasurer.

Annual Conference, 1947

The Executive Council have accepted with great pleasure an invitation from the Lord Provost and Council of the City of Edinburgh to hold the 1947 conference in that city. The conference will open on either 1st or 2nd October and will end on the 4th. Full particulars will be announced in due course.

The Annual General Meeting, 1947, will be held in Edinburgh immediately before the opening of the Annual Conference. A postal ballot for the election of Officers and Executive Council will be conducted during the

prescribed period before the date of the meeting.

New Publication

Under the new constitution members and representatives who request a copy may receive free of charge a copy of the *Proceedings of the Brighton Conference, 1946*. The price for additional copies and to non-members will be 2s., post-free.

Recent Publications

Other publications similarly available on request, with post-free price to non-members, are : (1) *Report of the October, 1945, conference on Improved Fuel Burning Appliances for New Houses* ; (2) *Domestic Fuel Efficiency and Smoke Prevention* (report of joint conference with the Institute of Fuel, Manchester, October, 1945) (1s.) ; (3) *Smoke Control* (suggestions to local authorities in respect to new installations) (3d., 2s. 6d. per dozen) ; (4) *The Smoke Problem and Science Teaching* (booklet for teachers with notes and experiments) (3d., 2s. 6d. per dozen).

Membership Appeal

Although the Society's financial position has continued to improve during the past year, thanks mainly to the general acceptance of the provisions of the new constitution, it is still gravely inadequate for the work urgently needing to be done, or even to meet the increasing requests for services the Society is now expected—and wishes—to render. Preparations are therefore being made for an appeal for new membership, including that of local authorities, and all members and representatives who may in any way be able to assist in this appeal, are requested to communicate with the General Secretary.

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Smokeless Air is the official organ of the Society, but the views expressed in contributed articles are not necessarily endorsed by the Society. Abstraction and quotation of matter are permitted, except where stated, provided the usual acknowledgments, including the name and address of the Society, are made.

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*Ships, towers, domes, theatres and temples lie
Open unto the fields, and to the sky ;
All bright and glittering in the smokeless air.*

SMOKELESS AIR

Fuel and the Future

THE recent "Fuel and the Future" conference in London, ambitiously and successfully arranged by the Ministry of Fuel and Power, and attended by about 4,500 people, demands a special reference in this journal. Although it was naturally concerned in part with the problem of weathering the immediate fuel crisis, this aspect seemed in fact to be overshadowed by the detailed consideration given, in many papers of high quality, to the long-term problems of efficiency and improved methods of coal utilization. Smoke prevention was not dealt with explicitly—except in an address to the Domestic section by Sir Ernest Simon—but everywhere one could say : "And this will mean less smoke." Forty years ago the smoke abatement faddists, as they were then regarded, aware of how smoke was one of the consequences of an appalling misuse of coal, might wistfully have dreamed of such a conference. But in the days when the coal wagons rolled endlessly from the pits their voices were unheard, and prodigious quantities of heat energy were wasted. The road to

smokeless air can now clearly be seen to pass through and emerge from the morass of crisis and near-catastrophe through which we are at present struggling.

Important Advances

Coming from the general to the particular the statements of most importance to the smoke abatement movement were contained in an address by Sir Guy Nott-Bower, Joint Deputy Secretary to the Ministry. He announced that the Advisory Council's report on "Domestic Fuel Policy" (now usually referred to as "the Simon Report") has been accepted by the Ministries of Health, Fuel and Power, and Works, and that as a first step these Ministries, and the Ministry of Supply, have set up an Interdepartmental Committee for Domestic Heating, with himself as Chairman. This development, by the way, was suggested by the Society a year or two ago. The Committee is to deal particularly with the question of appliances, the equipment of new houses, and later the problem of the replacement of obsolete appliances in existing houses. The second essential factor of the Simon recommendations, the progressively increasing production of smokeless fuel, was also being dealt with, and, said Sir Guy, this would be in the forefront of the programme of the new National Coal Board.

Sir Guy urged local authorities not to hesitate to put in the new, approved appliances. They are of the non-selective type, in which it will be possible to burn bituminous coal until smokeless fuel is more generally available. Local authorities should also note the significance of a statement also made at the conference by Alderman Charles Key, Parliamentary Secretary to the Minister of Health, who said that his Ministry would not dream of cutting out improved appliances from the plans of a local authority on account of cost. It is hoped that this statement will be noted by those local authorities, who, as the Society's recent questionnaire showed, have not yet appreciated that running costs are normally much more important than capital cost.

The New Situation

We feel that it is not yet fully appreciated by all in the smoke abatement movement how profound a revolution in the situation has occurred, first by the Simon report itself, and now by the first active steps by the Government towards its implementation. What the Society has been demanding in the field of domestic smoke prevention is in fact accepted and begun—as far as present material limitations permit. The qualification is important and cannot be ignored or brushed aside. The Society's own attitude and policy needs careful review now that the change has come: for example it is no longer a case of saying, "This is what we want the Government to do," for the Government has agreed that it will do it. Immediate work appears to lie more in the direction of stimulating and helping the local authorities, publicizing the implications of the new policy, and

keeping a watchful eye on every development to make sure that progress continues as fast as the limiting factors of the production of appliances and fuels will permit. The next few years will be exceptionally important.

The Industrial Front

The Society has been concentrating on the domestic problem during the last few years, but it now seems that the industrial side again comes to the fore. Here the first task is to secure the general application of "prior approval" regulations, a proposal of the Society's first made during the war and now already the law of the land for the City of London and for Manchester. A new approach to the whole question of industrial smoke prevention is needed, and the discussion at Brighton on the Society's preliminary proposals for new legislation clearly showed that ideas are in a transitional stage. There are at the moment some clear differences of opinion about some basic points, notably the view that the new control should be in the hands of the Ministry of Fuel and Power, as opposed to the conviction that it should remain with the local authorities. In the Society itself the latter opinion is generally held, but there is a further division of opinion on whether prior approval control can be undertaken most effectively by each local authority, no matter what its size, independently of its neighbours, or whether it will be preferable for authorities to combine, as joint boards, to carry out this and cognate functions. One speaker at Brighton suggested that all this had been settled by a discussion at the conference in Leeds in 1937, but surely the whole position is to-day radically different. In 1937 the new approach to smoke prevention by prior approval and maintenance of standards had not been seriously considered in this country. The general policy is accepted by the Society—as shown by the resolution passed at Brighton—and it is essential that we should discuss, with open minds, the best machinery for applying it.

Fluonomist

The fact that American undertakers call themselves morticians is of little interest to us, but we are disturbed to read *The Times* story of the chimney-sweep in this country who advertises himself as a "Fluonomist," and who charges sixpence more than the usual rate for the district. As the chimney-sweep has a vested interest in the coal fire and, as a deputation to the Gas Light and Coke Company some years ago shows, he is well aware of the threat to his livelihood, can it be possible that a first step towards a planned defence of the profession is being taken by the assumption of a more sonorous and dignified title? Perhaps it is being argued that although little public concern would be felt for the gradual passing of the chimney-sweep, there would be grave doubts about the wisdom of interfering with the well-being of the Fluonomist. We all know that with the golden lads and lasses chimney sweeps must come to dust, but one cannot conceive such a commonplace fate befalling the Fluonomist.

Conference in Brighton

THE Brighton conference attracted the largest number of members and delegates for any event so far organized by the Society. There were over 400 names on the list, and for the President and Council's Assembly in the Royal Pavilion there were nearly 550 present. The Music Room in the Pavilion was packed for each session, and for the film show during the Assembly there was standing room only for many.

The majority of those attending were delegates from local authorities, including many being represented for the first time. This was to some extent reflected in the discussion, for it is not until one's study of the problem has gone fairly deep that "smoke abatement" ceases to be a simple single subject and is seen to be a complex of more or less independent questions, each of which demands individual attention. "Why," a friend asked recently, "do you need another conference? Surely you are all agreed that smoke abatement is essential, so what is there to talk about at such length?" But if he had been at Brighton he would have learned how talk about smoke can go on indefinitely. The speech regulator on the platform, with its green, amber and red lights was a very useful and indeed essential traffic controller.

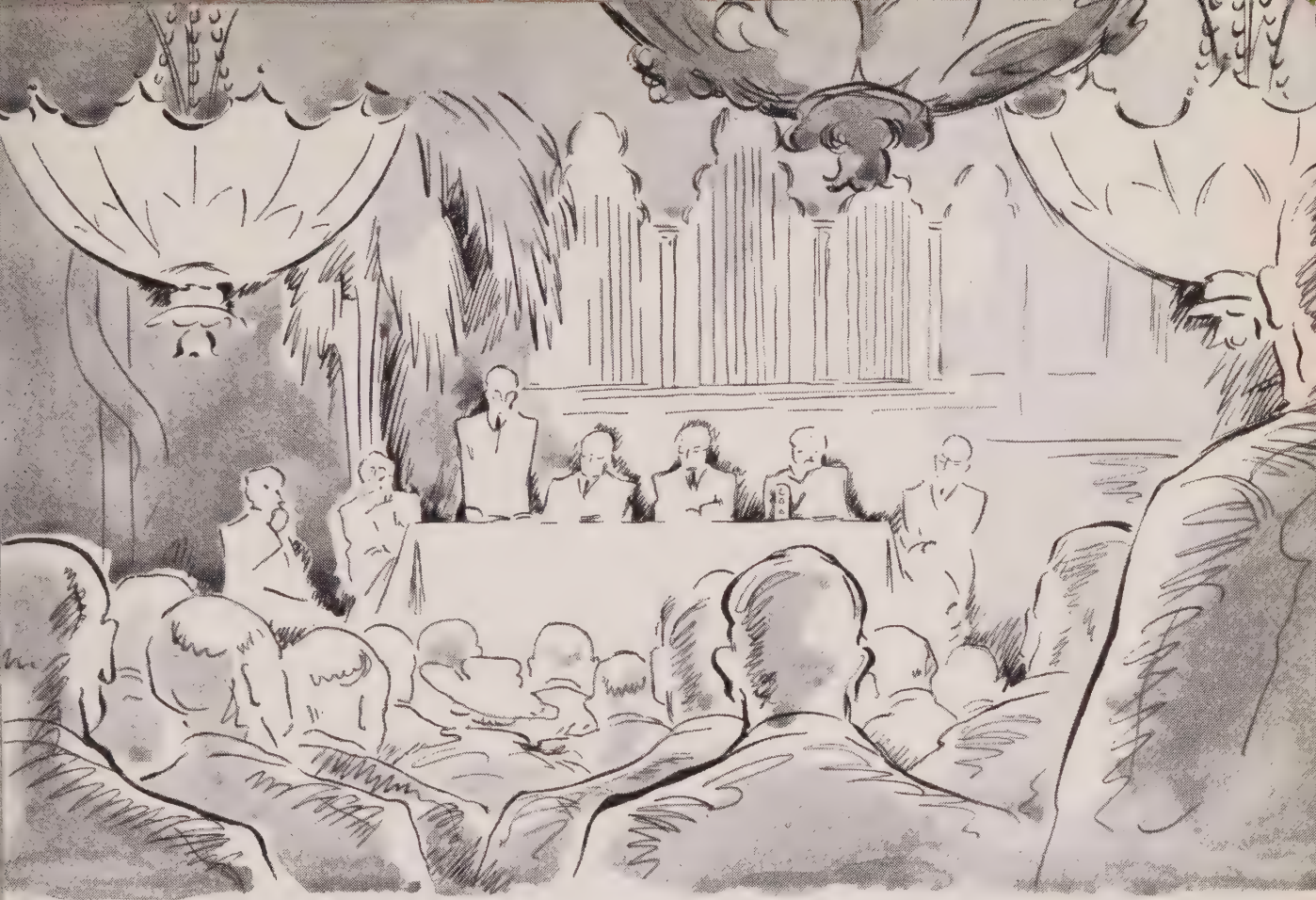
The meetings were earnest and enlightening, and were given a good start by the President's invigorating address and by the encouraging message from the Lord President of the Council, Mr. Herbert Morrison, who said that the Society was doing work of the highest national importance. His point about the waste of man-power involved in the production of smoke and in clearing up the mess it makes is a most important one.

Mr. Morrison's message, Sir George Elliston's address, and the papers themselves will be recorded in full in the *Proceedings* of the Conference now in preparation. The volume will include the discussions and the resolutions passed at the closing session. Those who attended will receive a copy, and one will be sent free of charge to any member or representative of a member who asks for it. For others the price will be 2s. per copy.

In this survey therefore, the subject matter of the meetings need only be mentioned briefly. First there were the reports on progress towards fuel efficiency and future smokelessness in the new houses, based on regional questionnaires to local authorities. The reports led to a wide discussion on the domestic problem in general, in the course of which a number of references were made to the difficult problem of attaining smokelessness in the mining areas, where each miner receives a supply of "house coal."

Proposed New Legislation

The second session was on the proposals for new industrial smoke legislation, in which the most outstanding of the four papers was by



An Impression of the Conference

Mr. Humphrey. His criticism of the proposed legislation being discussed will be welcomed, while he, in his turn will, we hope, appreciate the criticisms that were made of his counter-proposals. The question of whether the entirely new methods of smoke prevention and control that are needed—largely summed up as “prior approval”—can be carried out efficiently by local authorities, or whether they should become a function of the Ministry of Fuel and Power, is one that must be faced and is likely to become more acute in the near future.

A further problem raised, on which there was clearly a division of opinion, was that of whether stokers and firemen should be “licensed” or “certificated.” Here perhaps there was some confusion over what was involved, and it is likely that clarification will lead to a more general agreement. The question will be closely considered by the Technical Committee of the Executive Council, and we hope also to discuss it in *Smokeless Air*.

Those who were present at the Industrial session will be glad to know that Mr. Bowles, who was expressing the stoker’s viewpoint on the proposals, made a good recovery from the fainting attack that so unfortunately cut short his address. Mr. Bowles, who is an experienced platform speaker, had been feeling very unwell from the time he left his home in Birmingham the day before, but had been gamely determined to carry out his promise to speak.

The final discussion on the Saturday morning was opened by a stimulating paper by Mr. Gandy, who spoke on “What of the Future?” The opening contributions to the discussion told us what was being done and planned in the cities of London, Manchester and Bristol, while subsequent speakers—each with a four-minute time limit—

ranged over a wide field of subjects.

Then came the one breeze of the conference—the consideration of resolutions that had previously been sent in and co-ordinated by a sub-committee. There was some sharp criticism of the procedure adopted, and some lively passages over a resolution that the sub-committee had decided ought first to be considered by the Technical Committee. The confirmation of this decision was finally made by a vote taken as an amendment to a motion that the resolution be adopted by the conference.

The incidents were in fact further signs—and, on reflection, good ones—of the continuing development of the Society and of the much deeper concern being felt about smoke and air pollution generally. The whole question of resolutions procedure will no doubt be considered by the Council before the next conference, and two major points will presumably be given attention : (1) that to encourage resolutions and to give adequate time for their discussion might easily lead to so many being sent in that the conference would tend to become mainly a resolution-passing meeting, which would radically change its present nature and purposes ; and (2) that the conference is an *open* meeting, attended by many who are not members of the Society, so that resolutions passed may not always reflect the Society's considered policy.

The conference, after the warmth over resolutions, ended on a happy and harmonious note—the passing of an omnibus vote of thanks, proposed by Mr. J. W. Beaumont, Deputy Chairman of the Executive Council, to all who had been concerned in the arrangements and for the programme. The acclamation was unusually firm and sincere. This vote, too, will be recorded in the *Proceedings*.

A word must be said about the two social events, the second was an exceptionally enjoyable reception, with dancing, given by the then Mayor and Mayoress of Brighton, Councillor and Mrs. Walter Clout. This gave us all the opportunity, denied since 1938, of meeting each other outside the formality and restrictions of the conference room, in a friendly social atmosphere, with ample time for conversation and even plain gossip. Let not the unco-earnest decry such relaxation—at its lowest it is good propaganda ! The success of these events was undoubtedly helped by their environment, the most appropriate one can imagine. There can be no setting more fitting for such assemblies than that unique and entrancing pleasure-palace, the Royal Pavilion. Lucky is the town that has such a building, and wise is the Town Council that so generously allows visiting associations to have full and free use of it.

In conclusion, two incidental impressions gathered during the conference were, first, the wish that the proceedings should continue for a day longer ; and second, that the Society ought to have the support of many more local authorities, and that a drive to bring them in should be started. In point of fact a new appeal was being planned, and it will be materially helped by the resolution to non-member authorities that was passed at Brighton. We ask for any help our local authority representatives may give.

A Message to the Society from the Lord President of the Council

(The Rt. Hon. Herbert Morrison, M.P.)

I very much regret that press of Parliamentary duties has prevented my being present at the Conference of the National Smoke Abatement Society. The Society is carrying out work of the highest national importance. It is also work in which I am closely interested, as the Minister responsible for the Department of Scientific and Industrial Research, for the Department carries out research on atmospheric pollution.

It has been estimated that atmospheric pollution costs the nation about £50 millions a year. This is a conservative estimate, yet it is a grave figure and moreover it takes no account of the ill-health and dreariness caused by smoke. There are, however, two other aspects which make the solving of this problem imperative.

It has been estimated that the weight of smoke emitted in this country from burning coal is nearly three million tons a year. But that is not the whole of the waste, for smoke is always accompanied by unburnt gases; and it has been shown by the Fuel Research Station of the Department of Scientific and Industrial Research that, with an industrial boiler chimney emitting black smoke, the loss may be as much as 10 per cent. of the heat of the coal. We cannot afford to waste our precious coal in this way, especially under present conditions. As you know, the success of the Ministry of Fuel and Power's campaign for industrial fuel economy in reducing the emission of sulphur dioxide and smoke by as much as ten per cent. in a single year shows what can be done if we are determined to conquer this menace.

Waste of coal is bad enough, but waste of manpower is even worse. It is waste of manpower in the pits to make such inefficient use of coal. Manpower is also required for cleaning up the mess caused by smoke, and this is no inconsiderable item. So the work of the Society is aimed at conserving our two most precious commodities—coal and manpower—as well as money.

We should have a national drive to make the public smoke-conscious. Smoke in large quantities from industrial chimneys already rouses some feeling of resentment. I want that feeling increased, and aimed not only at the factory chimney but at the ordinary smoking domestic chimney, until public opinion will insist that smoke is anti-social and not to be tolerated.

Reviews

SMOKE and its Measurement : **Fuel Research Technical Paper No. 53** (H. M. Stationery Office, 6d. net). This report gives the results of investigations carried out at the Fuel Research Station of the D.S.I.R. on the quantities of smoke emitted from the furnace of an industrial boiler of the Lancashire type. The distribution of air supply to the furnace was so varied as to produce a range of different smoke densities. The amounts of tarry matter, ash and carbon in the smoke were determined by filtering, weighing and analyzing ; the density of the smoke was assessed by the extent to which it obstructed a beam of light transversing the boiler stack.

The tests showed that one small Lancashire boiler, making black smoke, is capable of passing 30 cwts. of solid and tarry matter into the atmosphere every week. The report makes clear that the heat wasted due to visible smoke, though not negligible, is only a small part of the total loss. The smoke is a warning of the greater losses that accompany it. Thus when making black smoke 2 per cent. of the heat in the fuel is lost as visible smoke, but the total heat losses due to the incomplete combustion of the invisible combustible gases may exceed 10 per cent. of the heat of the fuel.

The report is not only of great technical interest, but provides very useful data for the smoke prevention case.

Interim Memorandum on District Heating (H.M. Stationery Office, 3d. net). This is the first official announcement on the subject to be made by the District Heating Sub-Committee of the Heating and Ventilation (Reconstruction) Committee of the Building Research Board. It is intended only to be a forerunner of the comprehensive report that is so eagerly awaited.

After discussing briefly the experience in district heating that has been gained abroad, the Memorandum brings out the improvements in amenities and the efficiency that could result from this kind of development, and in particular the possibility of achieving a better standard of comfort with appreciable saving in coal. On the vexed question

of utilizing some of the heat now discarded from electricity generating stations it states that the linking of heat and electricity production in thermal-electric stations would lead to the maximum coal saving, but that in general the conversion of existing electricity stations is not practicable, since the necessary plant alterations would be very costly and would, moreover, involve a loss of electricity generating capacity which could not at present be afforded. It is suggested, however, that new thermal-electric plant, additional to the electricity generating plant now available, might be provided in either new or existing stations. Obsolete stations might be re-developed in this way, or as heating stations only.

Emphasis is laid on the need for gaining experience with district heating in this country. The Memorandum suggests that thermal-electric schemes might be tried out in central urban areas scheduled for reconstruction, or in large residential neighbourhoods, and that thermal schemes might be tried either in large residential neighbourhoods or in smaller housing estates.

A further Memorandum, also based on the forthcoming "Egerton Report" is **District Heating as Applied to Small Housing Estates**, published gratis by the Ministries of Fuel and Power and Works. This is a practical guide that will be of great help to local authorities considering district heating schemes. Site, central station, choice of heat mediums, costs, installations in dwellings, heat requirements and questions arising therefrom, are some of the main points discussed. Tables included show capital and annual costs for specimen schemes and there is also a useful bibliography. The Society has a small quantity of this Memorandum and will be glad to send copies to members on request.

Domestic Heating in America (H.M. Stationery Office, 3s. net). American methods of heating would make it possible to provide heat throughout the whole of one of our houses for 24 hours a day for about the same amount of fuel as was used before the war by open fires in warming a small part of the house. This is one of the conclusions of a joint party from

the Ministry of Fuel and Power and the Building Research Station and Fuel Research Station of the D.S.I.R. after spending nearly three months of the winter of 1944-45 studying heating, cooking and hot water supply in small houses in the U.S.A. and Canada, and whose report, now published, is an important and very informative document. It gives a comprehensive picture covering climatic conditions, fuel resources and costs, heat demands, distribution, sale and maintenance of appliances, the relationship of heating to house planning, smoke abatement, descriptions of appliances, chimneys, heat insulation, research work and consumer reaction.

The party visited a large number of cities from Boston on the Atlantic coast to Seattle on the Pacific coast, and from Montreal in Canada to Charleston (S.C.) in the south of the U.S.A. They met architects, heating engineers, public utility officials, appliance manufacturers, research workers, physiologists and housing managers. The party made a special point of visiting houses in almost every town to discuss heating, water heating and cooking appliances and heating systems with housewives.

In urban districts of the United States about a third of the houses are heated by steam or hot water central heating systems, a quarter by warm air, and just over a third by heating stoves. "Even in those areas of the United States where temperatures are comparable with those in Britain the designer aims at providing heating continuously for the whole house and regards the open fire simply as a social luxury and perhaps an extravagant one at that."

Technical descriptions of the appliances show that their efficiencies under test are required to reach a minimum of between 50 and 75 per cent. Considerable attention is paid to the performance, safety, convenience and cleanliness of domestic fuel-burning appliances. In the case of gas appliances it is illegal in over 200 cities to sell, instal, or use an appliance which has not passed the performance and safety tests of the American Gas Association.

The party visited a number of housing estates where hot water or fuel was supplied in unlimited quantities at a fixed charge included in the rent. There

was no evidence of extravagance or wastage of unmetered hot water. In houses where the tenants paid for the fuel the average consumption of hot water was about 33 gallons daily, as compared with an average of about 50 gallons daily when unlimited supplies were available.

There is a complete chapter on smoke abatement, about which it is said that in the U.S.A. the striking thing is the degree of awareness of the problem and the very considerable interest being shown. The party visited St. Louis, where the most ambitious programme of smoke control yet seen was begun in 1940. "It appears to be agreed by common consent," says the report, "that St. Louis was one of the dirtiest cities in the country, but is now quite remarkably smoke-free." Weather Bureau observations estimate a smoke reduction of nearly 75 per cent. for the period 1941-42 compared with 1939-40.

The report says, of the result of the change:—

"... there is no doubt whatever that it has been very striking indeed and officials of other towns are quite jealous of the results obtained by St. Louis. We discussed its effect on cleaning and other matters and were told that shopkeepers were aware of a considerable reduction in 'shelf losses.' Dry cleaners apparently did not suffer a loss of business, the explanation being that it was now considered worth while having things cleaned because they remained in reasonable condition for some time. The manager of a large hotel thought that it must have resulted in a saving on cleaning of fabrics of at least 30 per cent."

Speakers' Panel

The Society is about to prepare a new Panel of Speakers, who will be available for lectures and talks on smoke prevention and allied subjects. The list will be printed with general information about the Society's lectures services, and will indicate the type of lecture each speaker is prepared to give. If you are willing to have your name included please write to the General Secretary. The inclusion of your name is not likely to result in more than an occasional request to speak, and there is, of course, no obligation to accept any particular invitation.

The NEW LEGISLATION

The City of London and Manchester Acts Explained

THE first legislation embodying the new policies for smoke prevention are now on the statute book, and the Society has reason to be gratified by what can be claimed as the first fruits of its own endeavours. The principle of smokeless zones, it may be recalled, began to be developed by the Society only about 1936, and although what is now generally called "prior approval" is no new principle in other countries, it was first seriously urged here only in 1941, in the Society's memorandum on *Smoke Prevention in Relation to Initial Post-War Reconstruction*.

The smoke prevention sections of the City of London (Various Powers) Act, 1946, and of the Manchester Corporation Act, 1946, are therefore of historic importance to the movement, and as they may be regarded as the advance guards of much more legislation on similar lines, it is appropriate to review the relevant clauses in some detail.

The City of London Act

The purpose of the Act* is "to make temporary provision with respect to ward elections in war-damaged wards in the City of London and for other purposes." In Part III, Miscellaneous, section 14 (1) powers are given to make further byelaws for regulating smoke. That is, the power to make byelaws under section 151 of the Public Health (London) Act, 1936, is extended to

"include power to make byelaws requiring in the case of new buildings and in the case of substantial alterations in the arrangements for heating in any existing building the provision to the satisfaction of the Corporation of such arrangements for heating as are calculated to prevent or reduce to a minimum the emission of visible smoke."

The second part of section 14 is of interest. In brief it is a safeguard to allow the owner or occupier of any building to use whatever type of smokeless fuel he may in his discretion select, and to prevent the common council of the City from imposing conditions as to the use of any particular type of smokeless fuel or from withholding their approval on account of the type of smokeless fuel proposed to be used. A third section defines smokeless fuel as "any fuel which on combustion does not emit visible smoke." The effect of this safeguarding clause is to give the user complete freedom of choice of fuel—provided only that it is smokeless.

The new byelaws permitted under this Act are limited, it will be noted, to "arrangements for the heating of buildings." They do not

* Obtainable from H.M. Stationery Office, 3d. net.

therefore cover any industrial uses of heat, or even cooking. It is perhaps unlikely that any new industrial premises would, on other grounds, be allowed to be started in the City, and the possibility of smoke from cooking installations is probably remote. Nevertheless if the wording of this clause is to be used as a model elsewhere these two factors should be borne in mind.

These "prior approval" powers are, it is believed, regarded as adequate for all that can be done in the City in the near future. It is hoped that power to create smokeless zones will be sought in due course, but, armed with section 14 of their new Act the Corporation can ensure that the results of its immense task of reconstruction can be entirely smokeless.

The Manchester Act

The Manchester Corporation Act, 1946,* deals with many subjects—water, trolley vehicles, district heating, sewers and drains, nuisances, superannuation, and so on. Part VI is concerned with nuisances and sanitary matters, and begins, under section 35 (1) with a definition of the city's central area. It is that area bounded by St. Mary's Gate, Market Street, Piccadilly, Portland Street, Oxford Street, Peter Street and Deansgate.

Sub-section 35 (2) contains only nineteen words and unequivocally declares :

"As from the commencement of this section no smoke shall be emitted from any premises in the central area."

In these words we have the first, unqualified powers to establish Britain's pioneer smokeless zone.

Sub-section 35 (3) lays down that the penalty for smoke emission shall not exceed £10 and a daily penalty for continuing of not more than £5. Then comes the important provision, 35 (4)(a), that the smokeless zone as defined may be extended and applied to any area or areas within the city under an order made by the Corporation and confirmed by the Minister of Health. Action under this sub-section is controlled by provisions which require the proposals to be advertised, for objections to be laid, and if necessary for the Minister to hold a local enquiry.

35(5)(a) is to the effect that an order to create a smokeless zone may exclude any premises or defer for a specified period the operation of the order to any premises. 35(5)(b) is the familiar so-called "exemption" clause, under which the operation of an order to processes for the working of mines and for specified metallurgical operations may be deferred for a specified period or indefinitely if the Minister is satisfied that the inclusion of such processes would interfere with or obstruct them.

Sub-section 35(6) is to the effect that orders shall not come into operation until at least six months after the date of the first publication of the notice of confirmation, and sub-section (7) requires the Corporation to advertise confirmation. Section 63, relating to the date of commencement of certain provisions, stipulates that the provisions for

* Obtainable from H. M. Stationery Office, 2/- net.

the prohibition of smoke in certain areas shall not come into force less than twelve months after the first publication of an advertisement announcing the relevant resolution of the Corporation.

Sub-section 35(9) is of interest. It permits the inclusion in an order of provisions, as thought by the Minister to be expedient, for enabling lessees or tenants to make agreements with owners varying the terms of tenancies on account of the cost that may be incurred "in executing works or providing altering or adapting any fixtures fittings or appliances for the purposes of complying with the order." A tenant who has been unable to make such an agreement with an owner may apply to a county court for an order making such variations.

Sub-section 35(11) is a further, and unqualified exemption: "Nothing in this section shall apply to smoke emitted from a railway locomotive."

Finally, sub-section 13 of this section allows the Corporation, if they think fit, to "contribute the whole or part of the expenses necessarily incurred by any person in making the premises smokeless." This, it will be appreciated, is a precedent of potentially great importance.

Following section 35, on smokeless zones (although this phrase does not in fact occur in the Act) there comes section 36, on "prior approval." The first sub-section is of importance and may be quoted in full:

"No person shall instal in any building whether erected before or after the passing of this Act any furnace for steam raising or for any manufacturing or trade purpose unless such furnace is so far as practicable capable of being operated continuously without emitting smoke."

Here we find no explicit mention of "the heating of buildings," which is the criterion of the City of London Act, but presumably a "furnace for steam raising" covers central heating plant where steam is in fact raised. But does it cover a central heating plant designed to supply hot water and not steam? There appears to be, at least to the writer, some ambiguity here, and expert opinion will be welcomed. If the clause is not meant to refer to central heating plant it is a serious omission; if however it is intended to include such plant the phraseology is unfortunate.

Sub-section 36(2) refers to penalties for contravention, and (3) describes the procedure for submitting plans for new installations and requiring the Corporation to intimate within six weeks whether or not they are satisfied "that the furnace is so far as practicable capable of being operated continuously without emitting smoke." Sub-section 36(4) is to the effect that this phrase shall "have regard to cost and to local conditions and circumstances." If required by either of the parties this question may be decided by a court.

It is not necessary to consider the lengthy and detailed Part IV of the Act, which concerns the District Heating scheme for Wyhenshawe, but those directly concerned with the establishments of similar schemes will find it of value to obtain a copy of the Act for specific reference.

It will be of the greatest interest to observe the working of the two new Acts in practice and from the experience so gained to note the adequacy or shortcomings of these first essays in positive smoke prevention. One point should be noted : in both cases the purpose of the regulations is smoke prevention and smoke prevention alone. There is no reference to the wider question of promoting the installation of new plant that will ensure greater fuel efficiency. This could not easily have been included in the present Acts, but from the broadest point of view there may be something to be said for integrating the two factors under a single control. And whether smokeless zones can be set up without any reference to control of the fuel being used in the zone is an open question that Manchester may be able in due course to answer.

The Society is profoundly grateful to these two local authorities for the great lead they have given, and all members will join in wishing them every success in the wise application of their important new powers.

PROGRESS RECORD

Sanitary Inspectors' Association

A FULL and informative paper on "Atmospheric Pollution with Particular Reference to the Domestic Problem" was read at the London Conference of the Association in September last by W. B. Kennedy, M.S.I.A., M.Inst.Fuel, Smoke Inspector for the City of Manchester. The paper is reproduced in full in *The Sanitarian* for November.

Two resolutions on smoke prevention were adopted by the Conference. The first urged the Government to define its policy with regard to industrial and domestic smoke abatement "so as to enable industry and manufacturers of domestic heating and cooking appliances to plan accordingly." The second requested the Ministry of Health to urge all local authorities who acquire land for redevelopment and reconstruction "to ensure that when such land is redeveloped for industrial purposes the leases should contain covenants to ensure that no solid fuel burning plant shall be installed unless efficient for its purpose and as smokeless as possible; and that plans for such installations be submitted to the local authority for approval."

Sheffield, Rotherham and District Committee

Though the Committee resumed its deliberations more than two years ago, as no report has been submitted for publication, perhaps a brief retrospect will be of advantage.

At the beginning of 1944 pollution figures in this industrial area had increased by more than 50 per cent. over those of 1939, while average smoke emissions per observation had increased six-fold. Until the end of 1945 only limited work could be carried out owing

to shortage of staff, but now that members have resumed their duties systematic observation work has been continued in full, and a better perspective of the situation can be made.

The fuel situation presents difficulties, because many of the Works find that the fuels supplied vary to such an extent that continuous adjustments of working conditions are necessary. Out of 850 boiler houses, about 500 are mechanically stoked and many of the others would convert if they could obtain early delivery of the materials required. Perhaps the worst feature to record is that of taking mechanical stokers off boilers and fitting them with "forced draught" hand-fired furnaces, thus creating a bad smoke nuisance and reducing the boiler efficiency in order that a poor grade of fuel can be used.

Complaints have been made of nuisance from four large electricity power stations in the Don valley, and from the fuel figures supplied it is estimated that 1,178,000 tons of fuel per annum are burned, emitting about 107 tons of sulphur to the atmosphere each day.

In April, 1945, the Ministry of Health notified all local authorities that spoilbanks were to be again controlled by them, and asked that they would see they were properly controlled, as during the war. A survey of these showed that where "conical tipping" was being carried out there was a tendency to have deep-seated fires burning. During the war period water sprays were used continuously in many cases in order to control the fires. It has been found that this has now been discontinued and the spoilbanks are again beginning to cause nuisance, due to lack of supervision.

Since June last a Leasing Clause has been in operation in Sheffield making it an obligation for all lessees to submit plans of heating apparatus. There has been an amount of opposition, particularly in the central area, where gas and electricity are asked for, requiring additional work. Undoubtedly this is smoke abatement work of the right kind.

Greater London Advisory Council

The Executive Council is now meeting at regular intervals and a programme of educational and propaganda activities is being drawn up. Non-member local authorities in the area are being invited to join up with the present 60 constituent authorities.

West Riding of Yorkshire Committee

The Committee is purchasing from the Society over 1,600 copies of the new pictorial chart "These Are the Things that Smoke Does" for distribution in the schools of its constituent authorities.

Bristol and District

Recent developments have been centred on the City of Bristol itself, and a meeting of Bristol City Council Committee Chairmen and principal officers was convened to review the problem and to set administrative machinery into operation whereby the utmost possible would be done during planning and reconstruction to reduce the amount of air pollution to the minimum. Many lines of attack were discussed at this meeting including the possibility of creating a smoke-

less zone in the central planning area, district heating schemes, communal power plants for the new trading estates, together with the installation of smokeless grates and other approved apparatus in the new houses and buildings to be erected.

Following this meeting a deputation was sent by the Health Committee to the Planning and Reconstruction and Housing Committees. As a result of these discussions it is now reported that a Smoke Control Committee, co-ordinating all the interests concerned, has been set up. It should be placed on record that the Bristol Health Committee is very appreciative for the assistance which has been rendered by the National Smoke Abatement Society's Secretary.

Midlands Joint Advisory Council

Dr. Martine (Birmingham), Hon. Secretary, reports that membership now comprises 48 Local Authorities, each represented by both elected Member of Council and Technical Officer.

A meeting at Stoke-on-Trent on 19th September was attended by 54 representatives. Visits had been arranged by officials of the Stoke-on-Trent City Council. A tile-works, featuring up-to-date methods of firing designed to reduce the emission of black smoke from coal-fired kilns manufacturing both red and blue bricks was visited during the forenoon. After being entertained to lunch the representatives divided into two parties, each going to a china factory where the installation of gas and electrically-fired ovens has resulted virtually in the elimination of the pollution which formerly accompanied the coal-fired kilns at these works.

A course of instruction qualifying for the Smoke Inspector's Examination of the Royal Sanitary Institute is being held this winter at the Birmingham Central Technical College. Mr. C. A. Stansbury, Chief Sanitary Inspector, Walsall, has given five lectures on "The Air We Breathe" to Rotary Clubs in the district covered by the Council.

North West Division

A successful Joint Meeting of the Society's North West Division and of the North West Section of the Institute of Fuel and the Merseyside Civic Society was held in Liverpool on 28th November. The meeting, which was attended by over 200, including a large number of representatives of local authorities in the area, had Domestic Fuel Efficiency for its subject.

A paper by Dr. M. Barash, of the Ministry of Fuel and Power, reviewed recent advances and new appliances, and outlined the recent important developments in Government policy. Dr. J. L. Burn, Medical Officer of Health for Salford, stressed the health aspects of the problem and gave an account of interesting work done recently in his city on determining public opinion on the new appliances in the temporary houses. The third paper, by C. M. Opie, of the Ministry of Fuel and Power, formerly Smoke Inspector for Liverpool, reviewed developments in district heating.

A meeting of the North West Divisional Council was held in Liverpool on the morning of the same day.

New Appliances

A House Without a Kettle?

THE illustration adjoining is of the new Ascot Instantaneous Boiling Water Heater, which provides as desired a constant supply of boiling water, a governed supply of very hot water, and a continuous supply of hot water at desired temperatures. It is designed for domestic purposes only. To be able to have boiling water ready in one minute means that a kettle is unnecessary, and one can have the boiling water in little longer time than it takes to fill a kettle. The quantity is of course unlimited.



This service is effected by means of a water pressure governor and a temperature selector switch on the three settings "Boiling", "Hot" and "Warm". On setting to "Boiling", when boiling point is reached, the small initial flow is automatically augmented, thus ensuring the maximum flow of boiling water with minimum steam formation and a continuous supply of $2\frac{1}{2}$ to 3 pints per minute of boiling water within 60 seconds of opening the hot tap.

When the temperature selector is turned to "Hot" the governed flow is increased to a quantity sufficient to give a temperature rise of approximately 104 degs. F. Setting the temperature selector in "Warm", the governor is by-passed, and adjustment of the water temperature, up to 104 degs. F. above cold is effected by means of the hot tap. The standard "Ascot" safety devices are incorporated and in addition a special spout is provided which condenses any steam present in the outlet pipe and ensures an even flow of boiling water.

Radiator Heating by Electricity

The "Hurseal" heating system is an interesting development in smokeless space heating. It is based on a radiator built of light pressed steel which is loaded with a specially blended low expansion oil and completely sealed. Each radiator has its own specially designed sheath type electric immersion heater. The construction is such that the heat output is balanced by the electrical input, ensuring a constant surface radiator temperature regardless of whether the whole system or an individual radiator is in use. There is a quick temperature rise

to a low surface temperature of 165 degs. F., and the heating is evenly dispersed over a radiating surface of 20 sq. feet. The thermostatic control prevents overheating; there is of course no heat loss in pipe lines, etc., and the whole of the heat produced is given out to the room.

If a system of a number of radiators is in use individual radiators may be cut off as required. Connection to the power circuit may be permanent or the radiator made portable. It has a large "safety" margin, and for this reason was selected for use in war establishments where safety was a prime factor. Full details may be obtained from Hurtons (Heating and Sanitary) Appliances, Ltd., 106, Regent Street, London, S.W.1.



Hurseal Radiator—Inset Type

News in Brief . . .

Several of our newspapers have quoted from an article on the British coal industry that appeared in the American Magazine *Fortune*. About home heating in this country the article was moderately outspoken. Thus: "Although the temperature rarely drops below freezing, the Briton burns nearly as much coal as the average man in America, where temperatures descend to thirty below. And he heats not a house but a few cubic feet of damp atmosphere in front of one or two hearths. You can see your breath even in his dining-room and parlour, and you let hot water stand in his tub for a half-hour before you dare disrobe in his bathroom. His heat goes up the chimney as unburnt gas, which comes down to earth in your throat and lungs. You hack and cough and sneeze and shiver, and your nose runs like a fountain. You buy long wool underwear and wish someone would invent an overall suit that could be put on as you enter a house. You take refuge in bottles of 'lung mixtures' and tonics, and soon you are buying them by the case. But the Briton remains placid, impervious, firm in the belief that central heating is bad, and resists all attempts to change him. This winter he will waste a quarter of the coal needed to solve the world coal shortage. But he will have the grim satisfaction of hacking and coughing and rubbing his chilblains before the meagre fire on the hearth." ★ Readers interested in insulation may be glad to note that a Structural Insulation Association has been formed, to provide a source of general information and assistance on thermal insulation materials and their availability. Address :

1, Grosvenor Place, London, S.W.1. ★ The Southern Railway announces a big new electrification scheme which will cost £15 millions and reduce the number of steam locomotives in use from 1,800 to under 800. Together with the use of diesel-electric engines all steam locomotives will be completely eliminated on the system east of Portsmouth. The western side is not to be neglected, and efforts are being made to design powerful diesel-electric engines of over 1,600 h.p. which can pull heavy trains over the longer distances. ★ Medical members of the Society especially will like to make a note of a book by a fellow-member, Dr. S. Vere Pearson, *Men, Medicine and Myself*, published by the Museum Press at 12s. 6d. It is an autobiography which has woven into it not only the history of pulmonary tuberculosis during the last 45 years, but also a great deal of the progress of medicine in general. Smoke abatement is not dealt with specifically, but there is a chapter on "The Air Around Us." ★ To increase their output of "Coalite" for the domestic market in London and the south, Low Temperature Carbonization, Ltd., are increasing their works at Askern by 36 retorts. ★ Dr. Metcalfe Brown, Medical Officer of Health for Manchester and a member of the Society's Executive Council gave a broadcast in "Progress Report" on the North Regional Home Service on 30th September. ★ The Brighton conference liked the story told by Mr. Redstone, of Bristol. He said he would not mention the town concerned, and hoped he would not be misunderstood if he glanced at Dr. Metcalfe Brown. A family in this town, needing a holiday, inquired of a holiday resort as to the extent of rainfall in that area, and found it was the same as their own town. On pointing this out they received a reply from the Information Bureau of the holiday town admitting that the rainfall was no less, but pointing out that their's was *clean water*. ★ It is perhaps a little difficult to mention in one paragraph two new magazines that cover similar fields. But many members will welcome both *Citizen* (Walter King, Ltd., 1s. 6d. monthly) and *Civic Affairs* (Documentary Press, Ltd., 6d. monthly). Neither is failing to give attention to the smoke problem. ★ A different type of journal, but also with a bookstall sale is *Weather*, published by the Royal Meteorological Society. Dr. A. R. Meetham is one of the four editors, and in the November issue he contributes an article on Turbulence and Atmospheric Pollution. This is also a monthly and costs 1s. 6d. ★ Broadcasting in the Third Programme on the Black Country, Geoffrey Eley said: "There is nothing appealing about the towns themselves and over all of them—Wolverhampton, Tipton, Bilston, Walsall and the rest—there rises a blanket of smoke and grime from a forest of chimneys. And beyond that, if you look to the south-east, comes Birmingham. To many people the whole place is dismal, even hideous. But, be that as it may, these areas have the merit of being sharply defined; they have a definite end, after which the traveller finds himself in good open country." Delightfully subtle—it puts the community in the position of the man who, asked why he banged his head against a wall, said it was so nice when he left off.

SMOKE PREVENTION

ABSTRACTS

Acknowledgments are made, where required, to the Abstract sources indicated.

53. The Heat Pump for Space Heating, Onslow, D. V. (Heat. Vent. Engr., June, 1946, **19**, 512-527). A review of published information, with special reference to energy economy as demonstrated in America.

54. District and Other Heating, Thwaites, R. A. S. (Paper to I.M.E.A. Conf. 27th June, 1946; Elect. Times, 4th July, 1946, **110**, 9-12). The wide diversity of applications of heat available to electricity supply authorities was reviewed. It was pointed out that heat can be supplied by an electricity supply undertaking either in the form of steam or hot water, or as electricity to be converted into heat on the consumer's premises by means of a variety of appliances, some of which are recent innovations. In the second category are included (a) induction or eddy current heating for such purposes as surface hardening or melting metals; (b) dielectric heating of plastics and plywood; (c) infra-red radiant heat, for drying paint and enamel; (d) thermal storage for heating large buildings, and (e) the use of the heat pump for similar purposes. As regards district heating the working efficiency was given as 65 to 80 per cent., compared with anything from 15 to 70 per cent. for open fires, slow combustion stoves, small central heating units, small factory heating units and large central heating units.

55. Manufactures of Smokeless Domestic Fuel, Roberts, J. (Paper to N. E. Section Inst. Fuel; Inst. Fuel Bull., June, 1946, 219-24). The desirable properties of a good domestic coke are discussed and various methods for its production are described. (W.D.)

56. Production and Domestic Utilization of Reactive Coke, Thomas, H. H. (Paper to N.E. Section Inst. Fuel; Inst. Fuel Bull., June, 1946, 217-9). A review of experiments at Liverpool, Birmingham, Bradford and Rochdale indicates that reactive coke produced in vertical retorts, unlike normal vertical retort coke, is a satisfactory fuel for ordinary open-grate fires though the performance of the normal coke is improved if special grates are employed. (W.D.)

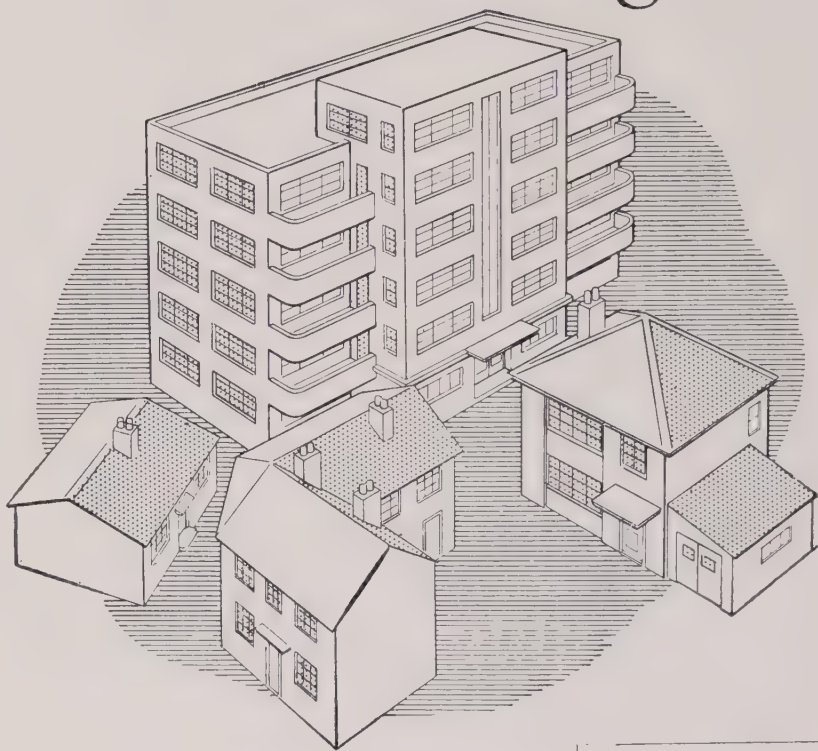
57. Peacetime Use of Atomic Power, Daniels, F. (Chem. Engng. News, 10th June, 1946, **24**, 1514-7, 1588). Due to the high cost of producing suitable fissionable material and construction of safe chain-reacting units, it is impossible to generate atomic energy to compete economically with coal and oil power plants at this stage of development. In all probability its most immediate application will be for marine use and for generating power in isolated regions where other cheap power sources are not available.

58. The Illinois Smokeless Furnace, Fellows, J. R. (Paper to Am. Soc. Mech. Engrs.; Heat. Vent., April, 1946, **43**, No. 4, 104, 106). The furnace consists of a backwards sloping grate with a central vertical suspended baffle which virtually divides the furnace into a coking chamber and a coke burning chamber. Fresh coal is coked with a supply of air and the gases are drawn under the baffle, mixed with secondary air and ignited by the surface of the live coals before burning in the combustion flue. The coke-burning chamber is supplied with air through a pinhole grate.

59. "Atomic Gas" (Times, 26th Aug., 1946). The Buffalo Machine Co., of Buffalo, has applied for a patent for a device designed to produce atomic gas which the company believes will one day provide American locomotives with sufficient power for journeys from coast to coast at the cost of a few shillings. An official of the company states that the device produces combustible gas from a commercial type of atomic "C" uranium, and has been doing so for six months.

60. Gas Producers Fire Cement Kiln, Ninci, M. (Rock Prod., 1945, **48**, (8), 116-7). Owing to the fuel shortage, cement kilns in Argentina are being fired with a mixture of 65 per cent. producer gas (from gasified wood) and 35 per cent. fuel oil. The process is satisfactory, about 175 tons of good quality clinker being obtained daily, while the detrimental effects of ashes and dirt are absent. (B.R.S.).

Electricity is basic in building



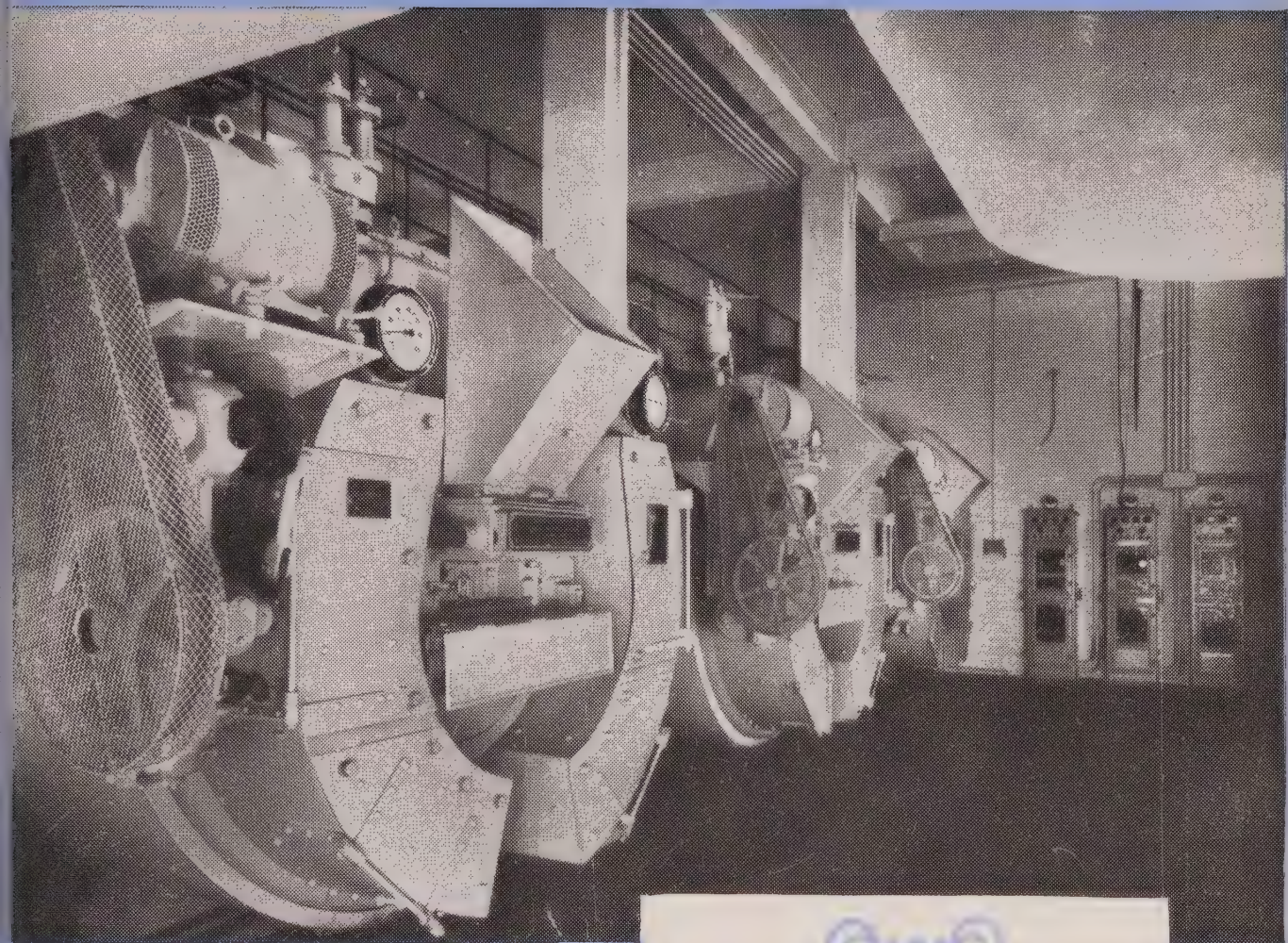
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For information and advice about the many new uses and greatly increased adaptability of Electricity consult your Electricity Supply Undertaking or the British Electrical Development Association, 2, Savoy Hill, London, W.C.2.

ELECTRICITY

Wonderful thing!

The Electrical Section at the Building Centre, Conduit Street, London, W.1, provides interesting illustrations of electrical applications in domestic and industrial premises.



(With acknowledgments to : Messrs. E. G. Phillips, Son & Norfolk, Nottingham—Consulting Engineers Messrs. Danks of Netherton, Ltd.—Boiler Makers).

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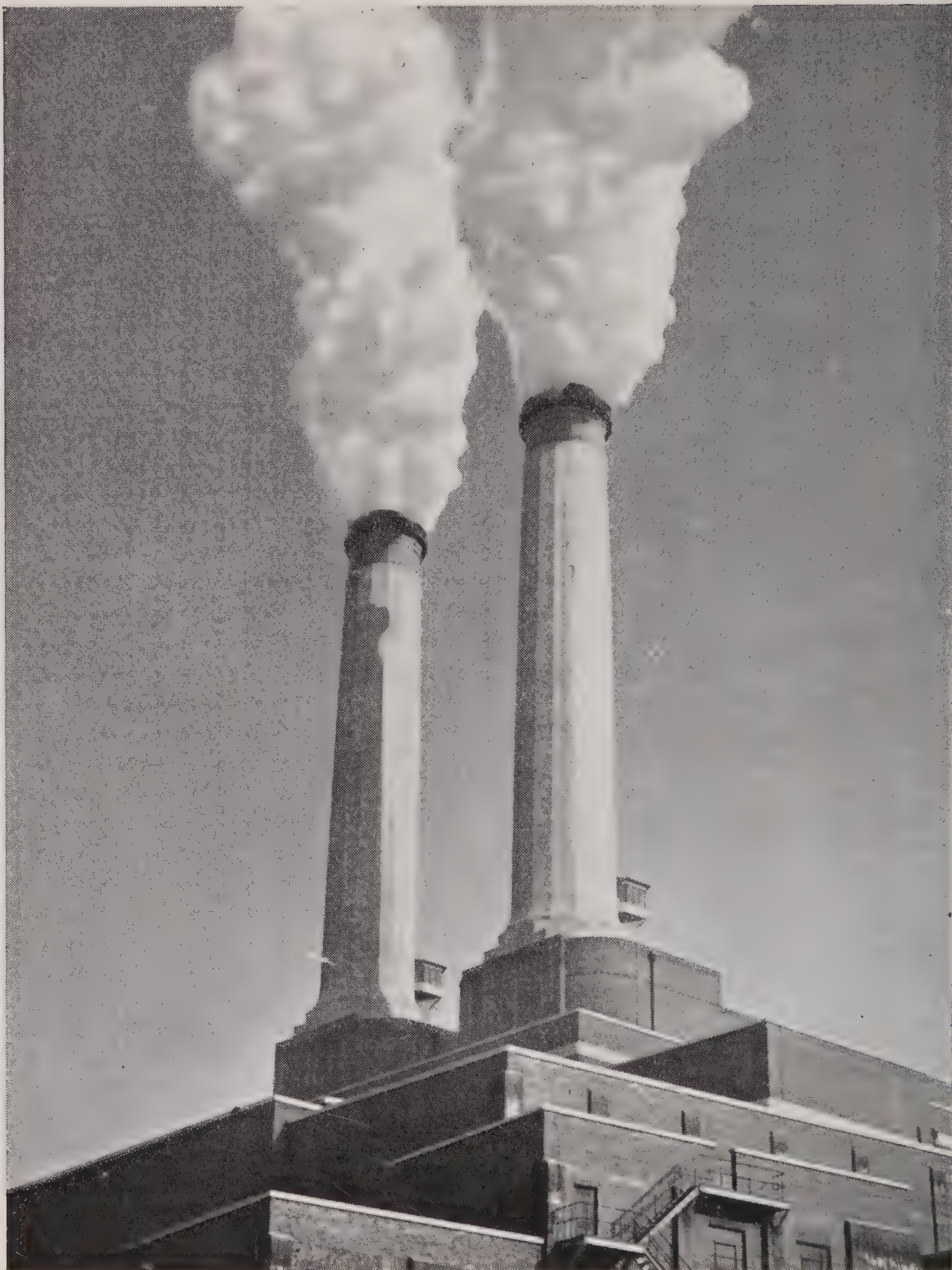
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SMOKELESS AIR

THE SMOKE ABATEMENT JOURNAL

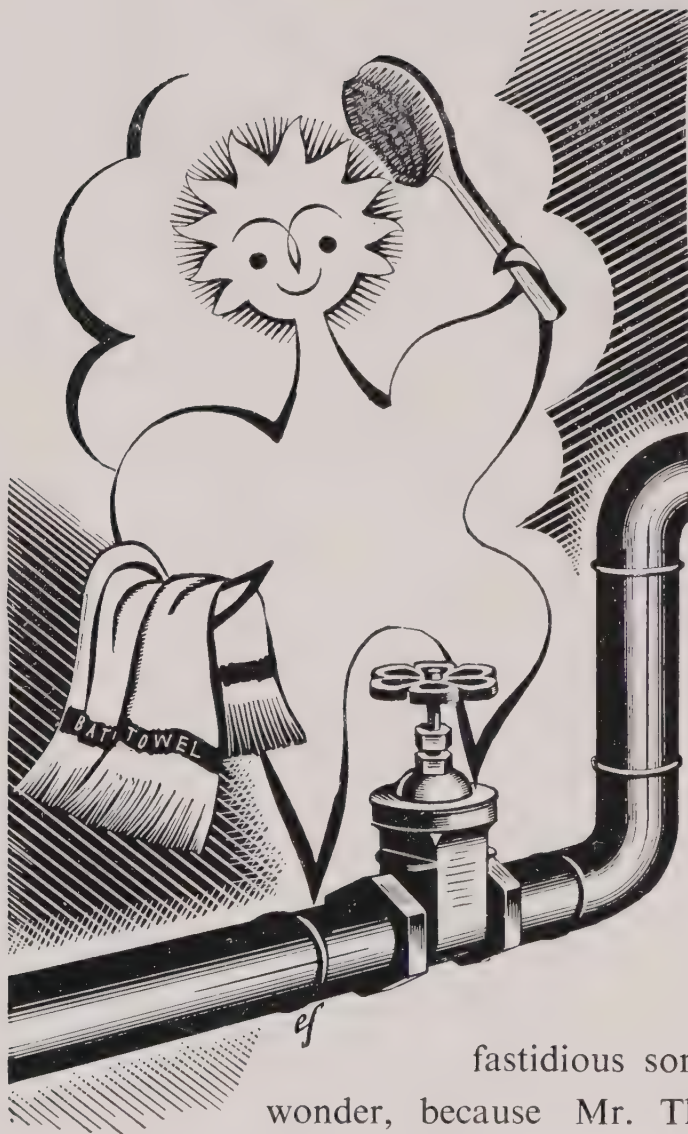


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ONE SHILLING

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**' I'M A
REMARKABLY
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WORKER '**

says Mr. Therm

Mr. Therm is a fastidious sort of fellow. And no wonder, because Mr. Therm represents gas, and gas is treated to a very thorough washing and purifying process long before it reaches the consumer. That is why gas means clean heating, without grit, dirt, ash or smoke . . . quick, controllable heating from hygienic, compact, labour-saving equipment right in line with modern industrial practice.

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Brentford Redevelopment. H. V. Lobb, F.R.I.B.A.

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HERE is the opportunity which may never come again . . . to plan our towns and cities, not only as a whole but down to the smallest detail in the individual houses that go to make them up . . . to ensure that these homes are comfortable and labour-saving, properly warmed, with a constant and adequate supply of hot water.

It has been demonstrated that this is possible, without adding to the cost of building. Open fires can be smokeless, sootless, easier to light, easier and cleaner to run. The *whole* room they are in can be warm, thoroughly warm, not merely around the hearth-rug. Abundant supplies of hot water for baths, wash-basins and kitchen can be available in every household at a cost well within the capacity of all to afford it.

The policy of this Association is directed to the most effective utilisation of our National fuel resources. The benefit of its wide experience of space-heating and hot water supply is freely placed at the disposal of all who are planning reconstruction.

THE LONDON & COUNTIES COKE ASSOCIATION
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In a house in the country where
no main water was available the
inhabitants used rainwater and
well water:—

When burning Raw Coal

|
Soot was produced from the chimneys
and deposited on roofs

|
Rainwater washed the soot from roofs
into storage cisterns

|
Cisterns sent sooty water into the
domestic boilers

|
Boilers sent scum into baths which also
got sooty

|
Householder changed to "COALITE"
and there was no more soot

|
They all bathed happily ever after

*The above is an extract from a letter received from a
customer recently*

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SMOKELESS COAL

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General Secretary and Editor :

Arnold Marsh, M.Sc.Tech., M.Inst.F.

OFFICIAL NOTICES TO MEMBERS

Edinburgh Conference

The 1947 Annual Conference will be held in Edinburgh, starting on the morning of Wednesday, 1st October, and ending on the Friday afternoon, with possibly a visit or tour on the Saturday. Fuller details and registration form will be sent to members and representatives later, and an invitation to local authorities to appoint delegates will be issued in May. In outline, the conference programme subjects will be : (1) Area organization for smoke prevention ; (2) Domestic smoke—basic policy ; (3) The Work of Government Departments for smoke prevention ; (4) Industrial smoke, including grit and sulphur problems ; and (5) Effects of smoke—visibility and flying, and health. In view of the heavier costs of arranging such a conference, including the printing of advance papers and subsequent volume of proceedings, the conference fee will be 1½ guineas.

Annual Report

All members and representatives should have received a copy of "N.S.A.S., 1947," which contains the Annual Report for 1946, financial statement and subscription list, general

information about the Society and services available, and lists of officers, Council, local authority members, publications, etc. We shall be pleased to send a copy of this report to any non-member on request.

Recent Publications

Under the constitution of the Society members and representatives who request a copy of current publications may receive one free of charge. Publications so available, with post-free price of additional copies and to non-members, are as follows : *Proceedings of the Brighton Conference, 1946* (84 pages) (2s.) ; *Report of the November, 1945, Conference on Improved Fuel Burning Appliances for New Houses* (1s.) ; *Report of Joint Conference with Institute of Fuel, London, February, 1945* (8 papers) (2s. 6d.) ; *Smoke Control* (suggestions to local authorities in respect to new installations) (3d., 2s. 6d. per dozen) ; *The Smoke Problem and Science Teaching* (with notes and experiments) 3d., 2s. 6d. per dozen.

Posters

The Society has several posters for which it is anxious to secure a wider distribution. The price is 6d. each, but copies may be supplied without charge. Members and others who arrange for the display of posters are invited to write to the General Secretary for further information.

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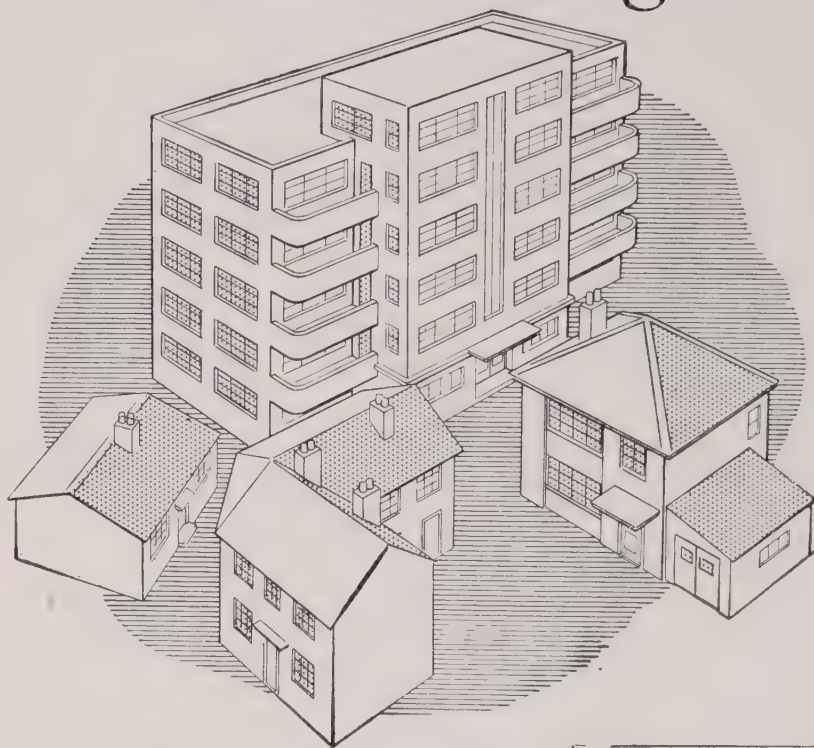
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If you are not a member of the Society, and if there is not a membership form enclosed with this copy of its magazine, please write for further information. Specimen copies of other publications and full particulars of the work of the Society and of membership will be sent without obligation. Individual membership subscription from 5s. and special membership for Local Authorities, Corporate Bodies, etc.

The Society's most urgent need is for more members.

Electricity is basic in building



Electricity, which was the *mainpower* behind the production of munitions of war, is a prime necessity in the building and equipment of the new and better homes for present-day Britain. Electricity is no longer a luxury to be enjoyed by a few; it is the *main source* of that comfort and cleanliness to which every householder is entitled. And, in addition to being indispensable, Electricity is able to meet the hundred and one demands which indispensability entails.

For information and advice about the many new uses and greatly increased adaptability of Electricity consult your Electricity Supply Undertaking or the British Electrical Development Association, 2, Savoy Hill, London, W.C.2.

ELECTRICITY

Wonderful thing!

The Electrical Section at the Building Centre, Conduit Street, London, W.1, provides interesting illustrations of electrical applications in domestic and industrial premises.



*Ships, towers, domes, theatres and temples lie
Open unto the fields, and to the sky;
All bright and glittering in the smokeless air.*

SMOKELESS AIR

Fuel Crisis

A CRISIS is defined as a turning point in the progress of anything, and to use the word to describe the recent fuel emergency is, for once, correct. For the lessons of the emergency will have done more to drive home the realities of the problem more than anything else has ever done, and will, it is hoped, be looked back upon as the turning point that was so necessary. A harsh and costly turning point, it is true, but perhaps in the long run most salutary. The precise moment and form of the crisis may be a matter of political disputation, into which we need not enter, but there can be no argument about the plain fact that when a consumption curve is rising more steeply than a production curve, even if the latter is also rising, the two must, sooner or later, cross. What the weather did was to nip together the approaching curves in a more than brutal fashion. There are two ways of ensuring that the curves do not cross again—

first, by steepening that of production, and secondly by pulling down that of consumption. Safety—and in due course coal for export—lies in doing both. The problems of production are complex and not directly the concern of this journal, although it is heartening to see that the trends are at last in the right direction; but we have a very close interest in the question of consumption.

Waste Not, Want Not

The consumption of coal can be reduced either by making users go short, through rationing or arbitrary cuts—the inevitable short-term policy—or by increasing efficiency so that users can satisfy their needs with less coal. The latter is the only real remedy, and it is of direct concern to the N.S.A.S. because it is also the way of ridding the country of the smoke tax that to-day, in the light of our economic difficulties, is relatively a heavier burden than ever. The short-term rationing policy that may have to be imposed may perhaps temporarily hinder smoke abatement by slowing down the change-over to smokeless mediums, and that is a further reason for pressing on with the more satisfactory remedy. There must be an intensification of all work for fuel efficiency in industry, for the training of stokers, and in making available new plant and equipment that is needed to enable industry to burn fuel more economically. But it is on the domestic side that the greatest advances are possible. New generating plant for electricity is of course an obvious need, but new carbonization plant must also be provided, to give both gas and smokeless solid fuel. The Simon report recommendations with respect to the installation of improved appliances in new houses, and, difficult though it may be, in existing houses, appear to be receiving moderately close attention, but the situation demands that they be given a much higher priority. Even before smokeless fuels are fully available the improved appliances can save coal and even a modest ten per cent. reduction in domestic fuel consumption would equal a week's coal production.

Tell the People

The public, shocked into awareness at long last of our vulnerability, is now ready, we believe, to accept that revolution in their domestic heating habits that is so necessary. Or at least the time is ripe for telling the public what the position is and what must be done: the moment has arrived for a great publicity campaign. Although this must be primarily for fuel efficiency it could well be supported by a complementary campaign for smoke prevention. That is what the Society, tied down at present by its lack of resources, is willing and anxious to do—it could undertake a service for the nation greater than it has hitherto conceived. And it is not only a question of the relation of smoke to fuel waste, but of the economic consequences of the evil. The smoke pall over Britain not only lessens health and vitality, but diverts a vast, even though diffused, amount of human and material resources from productive to non-productive channels. This was always a stupid waste, and if, as Wilde said, there is no sin except stupidity, then to-day it has ceased to be a venial sin.

The Fuel Saving Appliances

It will be recalled that at its Brighton conference the Society passed a resolution urging higher priority for the production of the improved appliances. This was duly forwarded to the Ministry of Fuel and Power, from which a helpfully informative reply has been received. It is said that since the statement made for the Ministry at Brighton the position has been gone into further in some detail. It is estimated that during 1947 something over 50 per cent. of the total demands for solid fuel burning appliances for new houses and maintenance can be met with appliances of improved types which are designed to burn smokeless fuel. "By the end of the year manufacturers representing about 80 per cent. of the total production will certainly have changed over to the manufacture of those types and therefore the rate at which demands can be met by appliances suitable for smokeless fuel should be increasing very rapidly."

The letter continues: "I think you should feel satisfied that the production of improved appliances has been given very close attention. Progress has been held up by the general shortage of labour in the foundries which has meant that the overall production was barely adequate to meet the reduced demands enforced by the Ministry of Health and in particular by the shortage of pattern makers, which has meant that new designs could not be brought to the production stage very rapidly."

"A further point which must be borne in mind is that during 1946 many of the houses constructed had been in course of erection up to 12 months and were therefore designed in 1945 when it would have been most unwise to elect for the installation of improved types of appliances. In 1947 there should be a very appreciable change in the position and we certainly hope that by the time your Society hold their next annual conference very great progress will have been made."

From this statement we see that during the present year we can expect to reach the half-way stage to the desired goal—half the appliances will be of improved, and half of obsolete, types. We recognize that the increasing rate of house building will make it difficult for the manufacturers to improve on these proportions, but feel that with some drastic encouragement the position might be greatly improved. In particular, what of the 20 per cent. of manufacturers who will still be turning out obsolete types? Cannot we hope for a complete embargo on such production during 1947?

Honours Deserved

Congratulations to two of our Vice-Presidents whose names appeared in the New Year Honours List. Sir Ernest Simon becomes a Baron and has assumed the title of Lord Simon of Wythenshawe, while Dr. E. W. Smith receives a Knighthood and will be Sir Ernest Smith, C.B.E., D.Sc. Both of these are honours well deserved for public services that will be appreciated by every member of the N.S.A.S. Sir Ernest Simon's chairmanship of the Fuel and Power

Advisory Council, the report of which on *Domestic Fuel Policy* is a landmark in smoke abatement, was of course only one notable service among many, and it is his work for housing that stands highest. Dr. Smith's great work in the field of fuel may not be so familiar to the general public, but in the fuel field itself there will be great satisfaction and pleasure that it has been recognized. On many technical aspects of the problems of making better use of our coal resources, on matters of national fuel policy, and as President of an Institute of Fuel that under his leadership has grown remarkably in influence and prestige, Dr. Smith has made outstanding contributions. The Society, too, has much to thank him for.

What Does the Society Do?

THE Executive Council have asked that a note be published in SMOKELESS AIR on an analysis that was recently circularised to them on the scope of the activities, or duties, carried out by the central office. They feel that members should know what the Society with its small H.Q. staff of four is doing, or trying to do. The Society's big problem at the moment is that there is far more to be done than can be attempted, and that jobs and projects have to be put in some order of priority—even though this means that some quite important things have to be relegated to the end of the queue.

The work can be divided—in paper if not always in practice—into distinct sections, each of which may be mentioned in turn.

Administration—Under this heading falls all the routine work of correspondence, accounts, subscriptions, and the keeping of records; membership and representatives lists, addressograph mailing list, and other tasks common to all organizations. This work has to be given first priority, for even slight neglect rapidly creates difficulties and means greater loss of time in the future.

Intelligence—To-day, more than ever, smoke abatement and all the many subjects it touches, does not stand still. In the fields of fuel and power, town planning and housing, industry, national and local administration, health and amenities, economics, overseas progress, and others, there is constantly something of importance or significance happening. The Society must know

about these things, and must keep on record, ready for reference, all that is of permanent value. This means trying to keep an eye on events in general, perusing the Press cuttings that come in from an agency every day or two, scrutinising *Hansard*, securing all relevant reports and other documents, pamphlets, books and journals. The library is growing rapidly and is having to be catalogued and indexed afresh in a form that, when it is completed, will make possible immediate reference to all available information on any of the numerous aspects of the smoke problem. *Services*—The work on intelligence is essential, and must have high priority, because the Society is more and more becoming recognised as the national centre for information on the smoke problem. Journalists and other writers, technical workers, speakers, local authorities and others look to the Society to supply them with information, or to put them in touch with other bodies, persons or sources that can help. Advice of many kinds is asked for, and then there are complaints about smoke nuisances and requests for assistance about them—sometimes even by both parties to a case! We have on occasion been able to put one Government department into touch with another on some technical or experimental aspect of the subject! As smoke abatement advances and the Society becomes better known this service steadily increases, and much of it leads to useful publicity.

Then there are requests for publications, for slides for lectures, posters and

exhibition material for loan. Publications are not yet as varied as we should like, and some of the most useful are in urgent need of revision and reprinting. Exhibition material is unfortunately limited: to provide just the kind that is wanted on every occasion would call for a very extensive and varied stock, and to look after and effectively develop this particular service could easily be made the main duty of an assistant. Another service is to supply speakers and lecturers for meetings that range from schools to scientific associations in any part of the country—a service that is to be developed, nationally and in the Divisions, by means of a Speakers' Panel.

Editorial—The editing and publishing of this journal and all the Society's publications, from leaflets to conference reports, is an activity familiar to members. Some publications must have high priority; others deserve it but regrettably have to wait. Some projected publications have been waiting for years. It is not only a case of preparing the text and planning the printing, but of making *effective* use of the finished job, and that may be the bigger and more expensive task. Stocks of publications or posters in the Society's offices are of no value, and each type has its own special distribution problem.

Council and Committees—Under the new constitution the Society has secured a more representative and dynamic Council than it had before. This has set up three Committees—General Purposes and Finance, Publicity and Technical. This organization stimulates as well as directs policy and activity, and naturally calls for greater attention and time in the preparation of agenda, reports and minutes.

Events—Under this heading may be grouped conferences, general meetings, joint-meetings, special exhibitions, and smaller but sometimes important happenings such as a deputation, joint action with other bodies, the issue of special policy memoranda, and so on. The organization of an annual conference, with its 400 or so delegates is now one of our major tasks, and in common with other events it has to be given a priority based on fixed dates. The preparation for the Edinburgh conference in October, for instance, began in earnest in January.

Publicity—This includes first Press publicity, a work that has had much success, and the planning of publications, circularizing information and policy statements, and many day-to-day items of opportunity—mostly unrecorded, often without tangible effect, but all part of the patient process of seeping smoke abatement into the public consciousness. For instance—a letter to an editor about something he has published, or one to an M.P. about a speech or question in the House.

Policy—The Society has a policy in the shape of proposals and schemes that it wishes to be taken up in the form of action or legislation by the Government, local authorities, industry, and others. One of its primary tasks is, to put it bluntly, to *agitate* for something to be done. It has built up a reputation for talking sense and for advocating policies that are practical. This means a clear understanding of what is involved, of the state of public and official opinion, and an appreciation of the importance of timing. And beyond the immediate work it must be thinking of and discussing the moves ahead. This work must go on if the Society is to thrive and exercise still greater influence.

Development—Nearly all the work so far outlined is at present severely restricted both in full effectiveness at its present level, and in the development that could and should be taking place. The reason is, of course, the smallness of our income. This means too small a staff—three times as many could be kept fully occupied—inability to make use of outside services, and other limitations. What has to be done, is that part of what money and manpower is available has to be diverted into appeals and efforts for new membership and support. It is an irksome necessity, and it is hoped that its need will in time diminish.

Administration, intelligence, services, editorial, Council and Committees, events, publicity, policy and development—these then are the main headings to the work, and to them we hope we may in time add Research. The items could be described in greater detail but enough may have been said to show how full the programme is. It has even been suggested that it is possibly too full, and that, paradoxically, the Society might do more if it did less!

Reviews

AFTER a long gap due to the war it is interesting to receive once again a report that is always of importance to the smoke abatement movement. The **82nd Annual Report on Alkali &c. Works**, by the Chief Inspectors (H.M. Stationery Office, 1s.) which covers proceedings during the years 1939-45 inclusive. Both the report by Mr. W. A. Damon, for England and Wales, and that of Mr. E. A. Balfour Birse, for Scotland, touch on so many smoke abatement matters, apart of course from other forms of atmospheric pollution, that it is difficult to review the report without making extensive quotations.

The problem of burning colliery spoilbanks is dealt with in some detail and it is significant to note the remarkable improvements that were obtained during the war when the prevention of glare was imperative. It is regrettable that since then the position has deteriorated, and it is hoped that Local Authorities in affected areas will exercise their powers to control this nuisance, as the report states they have been urged.

A section dealing with dust emission from cement works will be of importance to readers who are concerned with this problem. Specific mention is made of the exceptional scale of cement production in the Thames-side district.

Discussing the smoke question generally, Mr. Damon points out that the basis is the incomplete combustion of volatile constituents in the coal. "To use them as fuel," he says, "is uneconomic and I would support a proposal that the available supplies of bituminous coal should be reserved for processing only, whereby the more valuable constituents would be recovered and smokeless fuels produced. A long-term policy involving the control of coal supplies on such a basis would make for a more economic employment of national coal resources and would, in great measure, solve the smoke problem."

In November, 1945, Mr. Damon and Dr. J. S. Carter visited Germany to study methods for the elimination and control of noxious gas emissions. They report some stringent limitations that do not appear to have been very strictly enforced, greater control over the siting of new works and more autocratic

powers vested in local officials, but on the other hand in some instance a lack of precautions that would not be tolerated here. On the whole they came to the conclusion that conditions in Germany relating to atmospheric pollution by industry generally were no better than those in England.

The reader who keeps even a restricted collection of technical information on air pollution will find that this particular Alkali Report is essential.

* * *

During the Battle of the Atlantic, well over a thousand coal-burning ships of the Merchant Navy were fitted with smoke-eliminating devices to minimize the risk of their position being disclosed to enemy submarines by smoke trails. These were simple devices, controlled by the firemen to enable the correct amount of extra secondary air for complete combustion to be admitted over the fires for the exact time necessary to consume smoke. Credit for the development and application of smoke-eliminators is due to the Fuel Research Station, to the Admiralty, to the Ministry of Transport and to many commercial firms which co-operated. That appreciable fuel economies can be effected by the use of these methods is shown in **Fuel Research Technical Paper No. 54—The Reduction of Smoke from Merchant Ships**. (H.M. Stationery Office, 1s. 3d.).

Trials carried out on a marine boiler ashore had indicated that the production of black smoke involved losses of the heat available in the coal that could amount to as much as ten per cent., but how much of this could be saved at sea was not known. To carry out the necessary experiments a team from the Fuel Research Station made a voyage from London to Freetown, West Africa, and back in a cargo vessel of 7,000 gross tonnage having boilers equipped with smoke-eliminators. The two wing boilers were fitted with all the necessary equipment for comprehensive boiler trials. Arrangements were made to work one boiler with smoke-eliminators and the other without them on the outward voyage, and to reverse the procedure on the homeward run. Thus boiler characteristics and the weather factor could be dismissed and the true effect of smoke-eliminators determined.

One most important conclusion was

apparent from the trials—that visible smoke is only a warning of the serious losses of heat, in the form of unburnt carbon monoxide, hydrogen and methane that inevitably accompany the production of smoke. A complete heat account for the boilers showed that the accuracy of the trials was equal to that of trials carried out under less trying conditions on land.

It was demonstrated that the elimination of black smoke enabled an economy of at least $5\frac{1}{2}$ per cent. to be effected, equivalent to saving 1 to $1\frac{1}{2}$ tons of coal per day on that class of merchant ship.

* * *

Not many years ago one of the minor, but nevertheless serious, forms of smoke nuisance, or grit nuisance, was that from steam-driven vehicles, and in 1934 a deputation from the Society placed before the Ministry of Transport a case for exercising better control over vehicular smoke. Since then little attention has been given to the problem, but it was only from a newly-issued report **Steam Driven Transport Vehicles** that the reason became apparent—the number of vehicles in use has fallen from 9,000 in 1927 to 686 at present. This report (2s.) is issued by a Joint Investigations Committee of the Coal Utilization Council and the Solid Smokeless Fuels Federation, and is the result of an inquiry into the practicability of re-establishing the steam wagon as a vehicle for road transport in order to encourage the use of solid fuel for this purpose. The findings are far from encouraging and the only likelihood of re-establishing this form of transport appears to depend on the development

of an entirely new design. If there should be such a development, leading to a re-emergence of steam vehicles, the N.S.A.S. would doubtless demand that they should be entirely smokeless under all conditions, and should in particular attain total grit elimination. It is curious that the report, which lists in some detail the disadvantages of the steam vehicle, should not mention the nuisance complaints with which they were so frequently confronted.

* * *

The Silver Jubilee issue of the annual **Fuel Economy Review**, published by the Federation of British Industries (2s. 6d) is a mine of authoritative technical information. Its articles include atomic energy, fuel oil, gas, electricity, waste heat recovery, coal classification, and smoke elimination. The last is by T. F. Hurley, of the Fuel Research Station, and is an account of the new device for providing secondary air to a furnace that was first applied, as reviewed above, to ships during the war and is now being developed for land boilers. The article opens with a clear description of how and why smoke is formed.

For the non-technical reader the Gas, Light and Coke Company has published an excellent booklet, **Watson House**. This is the Company's research station at Fulham—one of the most important centres in the gas industry. An easily read and yet informative account is given of the work done at Watson House which will reveal to the layman the vast amount of scientific research and continuous control and testing that lies behind the services he receives from the industry.

Fourteen Facts About Smoke

We enclose with this issue a copy of a new "give away" propaganda leaflet—prepared initially for distribution at the *Daily Mail* Ideal Homes Exhibition at Olympia, at which the Society has provided smoke prevention material for the stand of the Solid Smokeless Fuels Federation. We would welcome the views of members on the value of this leaflet as a means for creating interest in

the problem and our own work, and shall be pleased to send copies—from half a dozen to a thousand—to any member who can distribute them. Apart from the opportunities obviously open to local authority and corporate members, individuals can help by giving copies to their friends or enclosing them in correspondence.



Smoke as the Airman sees it

We reproduce one of the most remarkable smoke photographs we have seen. The sky is clear and visibility good-- note the distant countryside



and sharp horizon above the smoke belt. Under the smoke in the foreground houses, roads, railways and factories are clearly visible. But the rest is impenetrable. This is what the airman sees, and demonstrates *what he cannot see*. The photograph is by Aero Pictorial Ltd., of 136 Regent Street, London, W.1.

Atmospheric Pollution from House Refuse Incineration

By WILLIAM H. ANDREWS

General Manager, City of Birmingham Salvage Department

IT is a popular conception that a "Destructor," or to give it a more correct designation (since matter is indestructible) a "Refuse Incineration Plant," is an unattractive building, and also that the operation of such a plant is necessarily associated with nuisances arising from smoke, dust and malodours. Such a conception, at least of a modern Disposal Plant, is fallacious, and there is ample evidence available to prove that works of this type can be of pleasing structural design and can also be operated without nuisance.

The picture (fig. 1) illustrates one of the Birmingham Refuse Disposal and Salvage Plants, and it will be conceded that the general design compares favourably with modern industrial installations.

Coal-fired furnaces and refuse incineration furnaces differ fundamentally both in design and in the fuel they consume. The fuel fed to a refuse incineration plant mainly consists of screened house refuse and the following analyses show the various constituents of house refuse according to tests taken during the four pre-war years in connection with investigations conducted by the Institute of Public Cleansing.

Analyses by Weight Showing the Characteristics of Domestic Refuse

Material	1933-34	1935-36	1936-37	1937-38
	%	%	%	%
Dust below 5/16" ...	39.03	36.35	34.83	34.61
Cinder 5/16" to 3/4" ...	17.77	14.38	15.03	13.92
Cinder over 3/4" ...	8.59	6.25	7.14	7.50
Vegetable and Putrescible ...	11.80	13.23	13.10	11.75
Paper ...	10.98	14.29	15.00	16.62
Metal { Containers ...	2.54	3.01	2.98	3.22
{ Other metal ...	0.94	0.99	0.85	0.86
Rags ...	1.67	1.89	1.65	1.55
Glass { Bottles ...	1.58	2.11	2.13	2.51
{ Cullet ...	0.75	1.25	1.12	1.24
Bones ...	0.45	0.48	0.47	0.42
Combustible Debris ...	2.27	2.14	2.40	2.32
Incombustible Debris	3.63	3.63	3.30	3.48
	100.00	100.00	100.00	100.00



Fig. 1. One of the fine refuse incinerators and salvage works at Birmingham

Tests of present-day house refuse would show some differences in comparison with the above figures, particularly in relation to lower paper and vegetable contents, having regard to more general salvage activities and to the separate collection of kitchen waste now carried out in most areas, in order to provide urgently needed food for animals. These variations in analysis are not likely to result in any appreciable effect upon the question of smoke problems, however, particularly having regard to the fact that after salvage and screening operations the fuel actually fed to the furnaces, which is usually described as “tailings,” consists mainly of cinders and organic matter generally in the proportion of about 2 to 1.

The amount of black smoke produced at any chimney depends upon the volatile matter in the fuel, and it follows that there is a much smaller risk of smoke pollution arising from the burning of cinders than from coal. This is so because the cinders have already passed through the domestic fire, and the volatile tarry matter in the coal got rid of in the production of heat, or up the house chimney with the products of combustion. In other words, the coal may already have done the “dirty deed” in its contribution to the pollution of the atmosphere. The residue, or cinders, can be burned in a properly designed furnace without nuisance and under normal conditions only a light haze should be discernable from the chimney of a Refuse Incineration Plant.

The garbage content in house refuse is, of course, a potential producer of smoke, as witness the humble garden bonfire which, due

to low temperature, can be responsible for volumes of acrid smoke, but the maintenance of high temperatures associated with modern Refuse Incineration Plants prevents the emission of grey smoke usually associated with the burning of garbage.

Combustion Chamber

One essential feature of the modern “destructor” is, of course the provision of forced draught which enables the conditions in the furnaces to be controlled and high temperatures to be maintained. A further essential provision is a combustion chamber where the gases intermingle and combustion is completed before the chimney is reached. As the recovery of the heat from the “tailings” is generally of secondary importance, the amount of air admitted to the furnaces is usually considerably in excess of actual requirements for complete incineration, and this tends to ensure good combustion, even if the stoker personnel is inexperienced.

On heating the organic compounds, decomposition takes place and many of the resulting gaseous compounds have a more or less objectionable odour. When such an admixture of gases is exposed to a higher temperature (which is usually fixed at 150 deg. F. as a safety point) they are themselves dissociated or decomposed and the resulting simple gases are without odour. It is generally accepted that this dissociation can only take place in the furnace itself, hence the provision of the combustion chamber and the need for the maintenance of high temperatures.



Fig. 2. General view of Screen Room where fine dust is extracted from house refuse

It is interesting to recall that in the early days of "destructor" practice when plants operated on natural draught, a fume cremator was sometimes provided at the bottom of the chimney or in the flue, between the cells and the chimney. This was nothing more than a coal or coke-fired furnace through which all the gases of combustion were made to pass.

These early installations were undoubtedly responsible for nuisance in connection with smoke and in other directions, and past experience of such plants, which are in no sense comparable with the conditions associated with modern installations, has tended to bring all refuse incineration works into disrepute. At the present time there is no reason for properly designed and well managed plants to create nuisance from smoke or other causes.

Incidentally, a modern Refuse Incineration Works requires considerable power to operate the extensive machinery and plant usually incorporated with these works. In Birmingham and certain other large cities, the electrical power required for works' purposes and for the charging of batteries of electric vehicles used for house refuse collection, is generated from the incineration of refuse "tailings." Steam for heating and other purposes is obtained from the same source, and in view of the low calorific value of this fuel, efficient combustion is essential.

The Dust Problem

It will be gathered from the above observations that a properly designed refuse incineration plant when efficiently operated should not be responsible for serious smoke nuisance. It cannot be gainsaid, however, that the chimneys of these installations can be offenders in another direction, which is in the emission of solid material in the form of fine dust. Reference to the analyses of house refuse on page 38 shows that the dust content below 5/16" comprises over one-third of the total. If this dust content is passed to the incinerators the risk of excessive dust emission from the chimney is considerable, in spite of the provision of dust-catching apparatus, as much of this dust is of such a fine character as to be readily carried away in the furnace gases to atmosphere. In the earlier "destructor" installations it was usual to feed crude house refuse direct to the furnaces with practically no pre-treatment or separation. The modern practice, however, is to separate the fine dust from the refuse by screening. Large mechanically-operated screens are used for this purpose (fig. 2) consisting of cylindrical frames covered with 5/16" welded wire mesh. The refuse as received at the works passes through the interior of these screens, ensuring an effective separation of the fine dust which is then transported by conveyor belt to large storage hoppers. In order to prevent dust nuisance at the disposal works during the screening operation, the screens are enclosed in steel casings and fan suction is also usually applied to these casings.

The screened dust is loaded from the storage hoppers, and in some parts of the country is disposed of as a low-grade fertilizer.

Where disposal facilities of this nature are not available the dust is usually utilized for land reclamation purposes in the filling of excavated sites or in the building-up of low-lying land. These sites when finally consolidated can be utilized for purposes such as sports grounds and allotments, and large areas of previously useless land



Fig. 3. Football Ground laid out on land reclaimed by the use of fine dust screened from house refuse

have been reclaimed in this way. Fig. 3 shows a football ground formed by means of fine dust deposits from a refuse disposal plant. Apart from considerations of the prevention of dust nuisance, the practice of screening house refuse prior to incineration possesses economic advantages in that much of the dust is incombustible and if passed to the furnaces unnecessarily utilizes labour and plant.

It will be appreciated that in spite of the pre-separation of fine dust by screening as described above, an appreciable quantity of dust with a nuisance potential is likely to escape the screens and, generally speaking, a boiler, especially of the water tube type, is reasonably effective as a dust arrester when operating under the conditions usually pertaining to a refuse incineration plant. During recent years, however, the tendency has been away from steam-raising plants, and other means are often necessary to arrest dust before reaching the chimney. The most general method at present in use in this country is the water dust trap, consisting of an expansion chamber through which the gases travel and impinge on the surface of the water. Provided the velocity of the gases is kept low the results are satisfactory.

Expansion chambers and deflectors in the flues in conjunction with dust pockets are also common practice and can all make their contribution towards the effective cleansing of the gases so far as the dust content is concerned. It is always advisable to keep the velocity of the gases low in order to allow the fine dust to fall out of suspension.

In conclusion, it is hoped that the above observations will assist in removing any erroneous ideas which may still persist that the incineration method of refuse disposal is necessarily accompanied by nuisance factors. Smoke nuisance should rarely, if ever, be present and adequate measures are available to counteract the greater nuisance potential of atmospheric dust emission.

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News in Brief . . .

For first-class smoke abatement propaganda listen to "Airmet" when the weather is appropriate. Airmet is the short name for the Air Ministry's weather bulletins for airmen which are broadcast from 7 a.m. to 6 p.m. daily on the long wave-band (1,224 metres). Current weather and airfield conditions are given. Listening recently we heard such reports as: "Smoke haze will thicken generally and there will be considerable smoke fog later in industrial areas"; "thick smoke haze or fog is likely to develop to the south and south-west of industrial areas"; and, more specifically, "Smoke haze is likely to develop in the Clydeside area and to spread along the Ayrshire coast. Smoke fog is likely to develop." The photograph on our centre pages illustrates this serious and expensive hazard. ★ The London *Star* of 1st February had a news paragraph that emphasizes the danger, disorganization and cost of this consequence of smoke: "Because London smoke reduced visibility to 700 yards at Northolt Airport at one time to-day, a Scottish Airways Dakota from Glasgow had to be diverted to Croydon after circling Heathrow for 30 minutes." ★ The Society is queerly addressed at times, and to be called the National Smoked Bacon Society is not unknown. But it was odd that in the same post recently there should be letters addressed to 'the "Royal Smoke Abatement Society"—which flattered us—and to the "Natural Smoke Abatement Society"—about which we are still rather doubtful. ★ We have been pleased to receive from the Stoker Manufacturers' Association in the U.S.A. their excellent and useful Technical Bulletin, which, in duplicated form, consists of extracts and abstracts of current interest in the field of fuel and fuel usage. There is a section on smoke, which among other things shows how much activity is going on in different U.S. cities towards improving smoke prevention legislation. One item that, as we write, is of really topical interest is about a method of keeping sidewalks clear of snow by means of steam pipes embedded beneath the surface. The S.M.A. address is 307, North Michigan Avenue, Chicago 1, Illinois. ★ We are glad to see that one of our members,

the Bradford Civic Society, draws attention to the smoke problem in its 4th Annual Report. It has been pressing for the installation of improved fuel-burning appliances in the Bradford housing schemes, and is able to give praise to the City Council for its action in this and other housing developments. The report is a fine record of first-class civic activity. Another news item is that the Health and Housing Committee in Bradford is proposing to make it a condition of tenancy that only smokeless fuel may be used where improved appliances are installed in their new houses, unless it can be proved that it is unobtainable in the locality. ★ An amusing story about one of our Vice-Presidents, Mr. E. H. Keeling, M.P., who is also Chairman of the Greater London Advisory Council for Smoke Abatement, concerns a visit he and Mrs. Keeling paid to Copenhagen last year, when he was Mayor of Westminster. After a civic luncheon coffee was served, but there were no cigarettes. Mrs. Keeling, feeling an irresistible desire to smoke, asked the Mayor of Copenhagen, their host, if she might smoke. He cordially agreed, but expressed surprise that she should wish to do something of which her husband could not approve. The whole company had in fact refrained from smoking out of Mr. Keeling's supposed principles—for it had been observed, it was explained, from the reference books, that he was chairman of a smoke abatement committee! ★ It is necessary to note, especially in light of the present fuel situation as well as from our smoke prevention viewpoint, that a recent Gallup Poll showed that 67 per cent of the population still prefer the open fire to any other. Even more significant, however, is the fact that if it would reduce the nation's demand for coal, no less than 68 per cent. would be prepared to do away with open fires and have central heating. ★ Those present at the Brighton conference will recollect the resolution that was strongly insisted upon by many local authority delegates, that all local authorities should support the Society through membership. This has been followed by individual invitations being sent to non-member authorities, and although the appeal is not yet finished, so far over 50 have joined up.

Royal Institute of Chemistry

DR. A. C. MONKHOUSE, Deputy Director of Fuel Research, read an important paper on Atmospheric Pollution at a meeting of the Royal Institute of Chemistry in London on 15th January.

In the course of his address Dr. Monkhouse said that smoke is due to imperfect combustion, particularly of tarry vapours. In a hand-fired boiler the evolution of combustible matter is not constant, a maximum being reached soon after firing. Smoke eliminators have been designed at the Fuel Research Station for forced- and natural-draught marine boilers, and for Lancashire boilers, which introduce by simple means sufficient secondary air at these periods of increased evolution of combustible matter. Tests made show that when heavy smoke is made, about 2 per cent. of the heat may be wasted as visible smoke, and an additional 6 per cent. wasted as combustible gases, such as carbon monoxide, hydrogen and methane.

A well-defined relationship has been found to exist between the optical density of the smoke and the quantity and composition of the suspended matter, and the combustible gaseous constituents of the flue gas. The most efficient combustion is obtained when only light smoke is made, the heat loss due to incomplete combustion increasing at a rapidly accelerating rate as the smoke density increases.

Grit or fly-ash from boilers can be removed by standard apparatus such as cyclones, electrical precipitators, and water washers. The type of fly-ash is influenced by the system of combustion, dependent on whether the ash spheres are formed from ash particles lifted from the fuel bed, or from the combustion of fine coal suspended in air or flue gas.

No satisfactory method of universal application has been found to reduce pollution by sulphur dioxide. Certain power stations have been equipped with systems for the removal of sulphur dioxide, but the processes are difficult to operate, and on a pre-war basis cost two to three shillings per ton of coal burnt.

Electricity from Gas ?

Dr. Monkhouse's paper was followed by a long and informative discussion, from which space permits only the quotation of part of the remarks made by Mr. T. Henry Turner, Chief Chemist and Metallurgist to the L.N.E.R., and a member of the N.S.A.S. Whatever the sources of power in the future might be, said Mr. Turner—atomic, hydro-electric, windmill, tidal had been suggested—the main source in the immediate future would be coal.

What could be done, therefore, to minimize the sulphur dioxide, dust and tar nuisances? He suggested that any planning of new electric power houses or satellite towns should bear in mind that the gas industry grew up on its own through the initiative and commercial acumen of a group of people. Another group of pioneers developed the electrical industry, and a third group of specialists, the chemical industry. These three industries should now be grouped together, and only anthracite, coke or other smokeless materials should be permitted for solid fuels.

Bituminous coals must first go to the gas works, have their by-products extracted for the adjacent chemical industries, and pass to the powerhouse as gas or coke. Gas could be burnt in steam boilers with the use of suitable radiants or possibly in gas turbines in the near future.

The smoke problem, concluded Mr. Turner, was a curse that would remain until people felt so strongly about it that they would spend their own taxed money in subscriptions to the National Smoke Abatement Society.

Believe It Or Not

Fuel Efficiency News, the Ministry of Fuel bulletin, quotes the case of a new building being designed, in which the architect planned for heat insulation at a cost of £1,600, and which on account of cost was turned down by the Board. To balance the heat losses from the non-insulated building the heating plant had to be modified—the further cost of which turned out to be just £1,600! But that is only the beginning of the story—the increased amount of coal that will be required is 700 tons a year.

Review

Electricity and the Simon Report

MEMORANDUM on the Report by the Fuel and Power Advisory Council, issued by the Electricity Supply Industry.

In this 16 page Memorandum some of the more important recommendations of the *Domestic Fuel Policy* are strongly opposed, and we are bound to express our own regret that the Committee responsible for the memorandum should, both directly and by implication, criticize the policy for the elimination of domestic smoke that has been developed by the Society and broadly accepted by the Advisory Council, without offering any alternative of a practical and constructive character.

The Memorandum is based on the proposition that electricity is the only medium for lighting, heating and power requirements in domestic premises capable of being the sole medium for such purposes. This, however, is very different from the proposition that electricity can in fact, and within any reasonable period of time become the sole and exclusive medium for all these purposes, and yet the argument appears to depend on this latter assumption. If it could and had been shown that electricity in addition to other tasks—in the home itself, in industry, and above all perhaps, in railway electrification—can take over the whole of domestic heating, including that now carried by some 12 million existing coal fires and the entire heating of another four million houses to be erected in the next decade or so, and can at the same time persuade the 67 per cent. of the population which still prefers open fires (as shown by a recent Gallup Poll) to give them up *in toto*, we should be second to none in our enthusiasm. The Memorandum's hostility to planning a better use of solid fuel can be valid only if there is such a case for complete electrification at an early date, and yet no evidence whatever is given even to suggest such a possibility. The generating plant required, even for the present miserable system of warming single rooms (instead of warming the whole house) would be immense, and most of it would be idle during the summer

months. It has been recently demonstrated, only too forcibly, that the generating plant is simply not there, and that it will take years even to make up the present deficiency, which in comparison with the load for the complete heating of every home is a mere bagatelle.

Smokeless Zones

One of the most baffling paragraphs in the Memorandum is our own particular concern. Smokeless zones are condemned as impracticable, but the only reason put forward to support this sweeping contention is that it follows from the recommendations of the Advisory Council—one of which, incidentally, was to establish smokeless zones! It is said that if the Electricity Industry's proposals were accepted smokeless zones would not be necessary. This appears to mean that when there is no smoke there will be no need for measures to prevent it. If, at one stroke, by the mere switching on of limitless electrical energy, smoke could be for ever banished, it would be unnecessary to take progressive steps, the clearing or "mopping-up" in one area after another, of sources of pollution, which our more matter-of-fact experience has led us—knowing that progress, however inevitable, can only be by stages—to advocate.

On one point we are glad that we fully agree with the Memorandum—that when obsolete solid-fuel-burning appliances are replaced by improved types for smokeless burning, and if a subsidy or grant is made to encourage this, the user should if he wishes be able to specify an electric appliance instead of having to have one for solid fuels. We would even extend the option to include gas appliances.

A Memorandum such as this might have been constructively critical and helpful, and we are indeed sorry that our electrical friends should have put out such a remarkably unconvincing document. The more carefully it is studied the more does it strengthen belief that the balanced policy of the Simon Report is substantially correct.

Washing Day—for Lungs

“WHAT’S that?” said Alice.

I don’t know whether it is generally understood, but women are terribly curious. Alice is.

“That,” I replied ponderously, “is an X-Ray photograph of Mrs. Oswaldtwistle’s chest.”

“An X-Ray photograph! Oh, let me see it! It does look funny. I am sure those dark things should not be there.”

“Those are the ribs,” I replied ominously. “It was Adam who lost a rib, and even in his case he didn’t lose them all!”

“No,” said Alice, hastily, “I mean that bit in the middle.”

“That’s her heart!” I returned in surprise. “Do you really suggest . . .”

“Of course not, but just tell me about the photograph. Is it really a good likeness—I mean, is there anything wrong?”

“As a matter of fact, her lungs are normal, but dirty.”

“Dirty!” said Alice in open-mouthed amazement, “but Mrs. Oswaldtwistle is *awfully* particular, and I am sure . . .”

“Well, she doesn’t wash her lungs regularly and they *are* dirty!”

A Conversation Piece by Dr. Hugh Paul, Medical Officer of Health, Smethwick

(Reprinted by kind permission of *Better Health*)

“But how can a person wash out lungs? I never heard of such a thing.”

“She can’t!” I replied calmly, “and that’s why her lungs are so dirty. You see those shadows there. They show the effect of years and years of breathing in masses and masses of dust and dirt-laden atmosphere.”

“How horrible! What does it do to the lungs?”

“Well, the effect is difficult to describe, but it’s something like what happens when grit gets into a cut finger. It causes irritation, and the irritation causes the lung tissue to react. Fibrous or scar tissue is formed, and the elasticity of the lung is impaired. The amount of dirt inhaled in a day is not very much, except in some special occupations, such as mining, but when it goes on for years on end, the cumulative effect is considerable, and the resistance of the lungs to disease is quite definitely impaired.”

“You mean, pneumonia?”

"No, not necessarily. Bronchitis is common, but in some cases the damage is such that even tuberculosis may supervene."

"How terrible! Are my lungs like that?"

"Probably," I replied callously.

"And can't we *do* anything about it?"

"Of course we can. These dirty lungs are a luxury, and we needn't have them unless we want to. . . ."

"A luxury? But no one really *wants* to have dirty lungs!"

"Well, they needn't have them."

"How can they prevent them?"

"Quite simply. The atmosphere in our towns is something awful, due to a heavy pall of smoke. . . ."

"Well?"

"And this smoke is mainly—two-thirds of it—caused by smoke from private chimneys."

"Oh!"

"Yes—two-thirds of it. And all of it is unnecessary. Coal is scarce, and yet we waste most of it by burning it inefficiently in open fires and kitchen ranges. . . ."

"We must have fires."

"Of course. But if the only fires used were coke fires, or fires made with smokeless fuels, or gas and electric fires, there would be no smoke!"

"No?"

"And if industry also used only smokeless fuels in modern furnaces—and this is the tendency—Bradlingham would have as pure an atmosphere as Harrogate, and there would be no dirty lungs!"

"I see. But it's no use one person doing away with coal fires, is it?"

"Yes it is! Everyone who gives up open coal fires is doing something to help. And incidentally, there is more heat value in coal when it is broken down scientifically into gas and coke, than when it is burnt in an open fire. The fog in our towns is not only dirty, but it is a waste of many tons of good unconsumed fuel!"

"I see. Your motto would be: keep the coal in the gas works, and not in your lungs!"

"Yes. It lasts longer in the lungs, but it doesn't warm you."

Abstracts—concluded from page 48

full district heating service. *Bonnyrigg (Midlothian)*: A small straight thermal scheme serving an estate of 182 cottage-type properties. Its development will prove to be of considerable interest. *Salisbury (Bemerton Heath Estate)*: This is of particular interest because it is the first scheme to be planned in the South. The estate embraces about 520 houses of varying types. *Westminster*: The district heating scheme submitted by the Westminster City Council for Pimlico

differs from those described above in that it is proposed to buy heat and hot water from the Battersea Power Station. The London Power Company will instal two sets of passout turbines to provide the heat load and this will be conveyed to the estate by means of an underground tunnel under the Thames. The estate comprises some 1,600 flats. In addition to these schemes, others are under consideration and many more are known to be coming forward.

SMOKE PREVENTION

ABSTRACTS

Acknowledgments are made, where required to the Abstract sources indicated.

61. Coal Burning Turbine Locomotive (Bit. Coal Inst., U.S., Nov., 1946). Full-scale operational tests of the combustion apparatus and fly ash separators for a coal-burning railroad gas turbine are being made. Requiring no water, this locomotive will carry a larger charge of fuel for long 1,000 mile trips without refuelling. It is quiet and smokeless and the small amounts of powdery ash can be used en route to "grit" the rails. The complete motive unit is lighter in weight on the tracks than is the Diesel locomotive of the same horse-power. Efficiency is expected to equal that of the Diesel and will far exceed that of the conventional steam locomotive. (S.M.A.).

62. L.C.C. and Atmospheric Pollution (Engineer, 23rd Aug., 1946, 182, 177). At a meeting of the L.C.C. the Housing and P.H. Committee recommended that the Minister of Health be asked to set up an independent body to inquire into the extent of the discharge into the air of sulphur and its compounds from installations, such as electricity generating stations, consuming large quantities of coal. The Committee further suggested that such an independent body should determine and advise on the best measures which could be taken to extract sulphur and its compounds from flue gases from such installations.

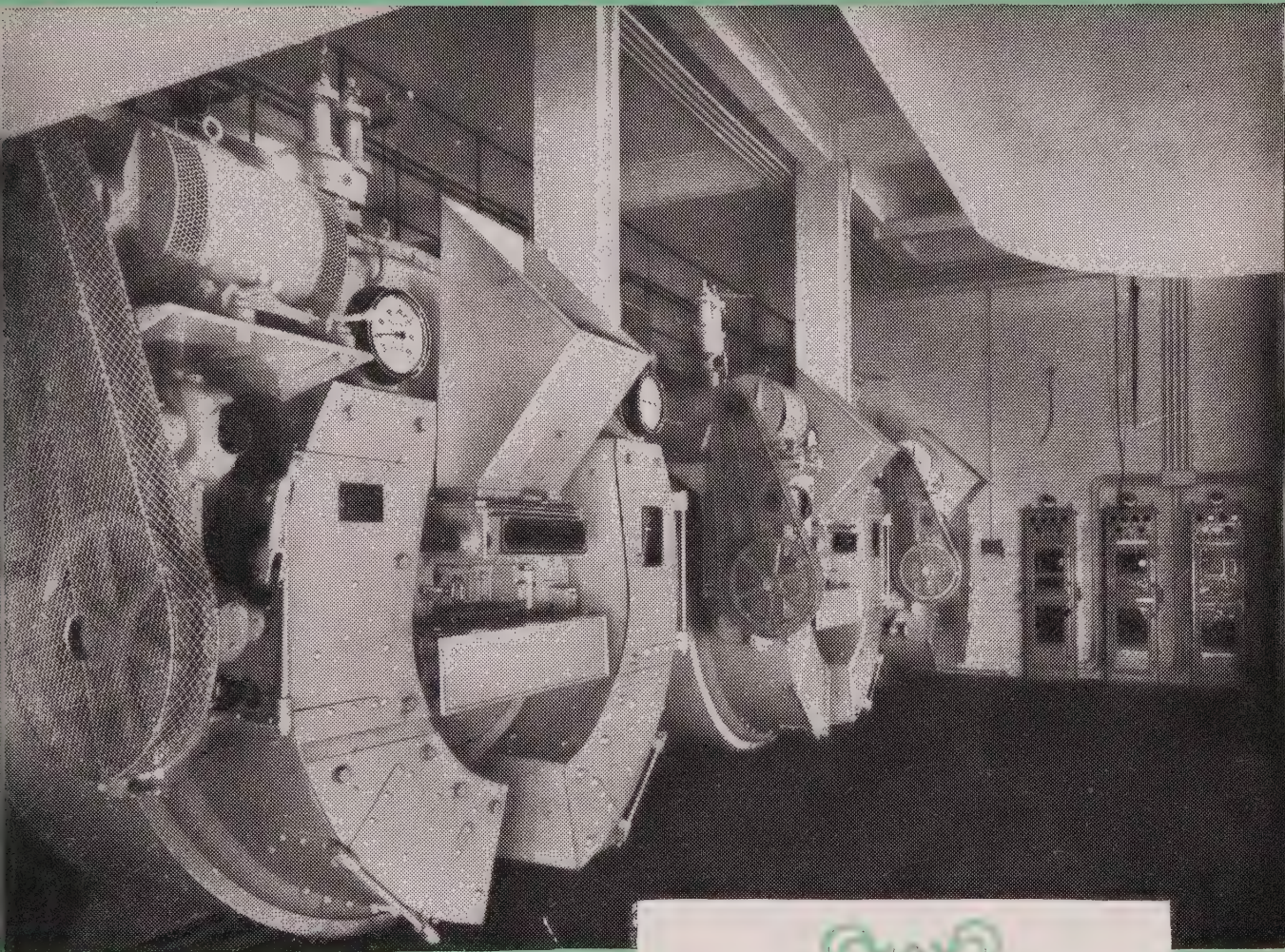
63. Smoke can be Controlled, Wise, I. L. (Am. City, July, 1946, 59, 7). Data on waste of fuel by industrials, railroads, fuel producers, electric and gas utilities; analysis reveals that greatest waste (18.4 per cent.) is from industrial use of fuels. Domestic heating (10.8 per cent.) is third on list. Recommendations are given to alleviate present detrimental prevalence of smoke, soot, grime and existing national fuel shortage. (Engng. Index Service).

64. Smoke and Cost of Power (Times Review of Industry, Feb., 1947). The technical aspects of de-dusting systems are examined, with reference to dry and wet systems, electrostatic precipitation, and multi-cell arresters of recent development. The washing systems at Battersea and Fulham Power Stations are discussed.

65. Domestic Heating (Public Health, Dec., 1946). Memorandum of evidence submitted by the Society of Medical Officers of Health to the Domestic Equipment Sub-Committee of the Ministry of Health's Central Housing Advisory Committee, November, 1946. For kitchen-living-room types of house preference is expressed for openable stoves of modern types for the kitchen-living room, and for separate living-rooms open fires burning solid smokeless fuel or gas or electric fires. For working-kitchen houses the back-to-back range such as the No. 3 Yorkdale is suggested. Bedroom heating by convection from this and with electricity or gas for topping up is favoured. Among other points, mention may be made of the view that there is no case for a coal fire in a bedroom used as an occasional sick-room except where electricity or gas is not available. Wall or hopper ventilators are considered advisable in all bedrooms.

66. New York Campaign Planned (New York Times, 11th Jan., 1947). Health Commissioner Weinstein has announced that he will lead a campaign for better enforcement of anti-smoke laws in New York City. With the support of Mayor O'Dwyer, whose interest is expressed in a promise to "give every possible help to such a worth-while programme," it is hoped that the city will give the problem the attention it deserves. Dr. Weinstein asks for a budgetary expenditure of \$100,000 for preliminary plans and additional personnel to begin the smoke abatement programme. It is considered that if, as the U.S. Public Health Service once estimated, smoke costs the nation an average of perhaps \$20 per person annually, New York could as a city of nearly eight millions afford to pay \$150 millions a year if it would rid the city of smoke.

67. District Heating (Fuel Effcy. News, Jan., 1947). The following schemes have been considered and approved. *Urmston (Lancs.)*: A straight thermal scheme serving approximately 1,300 houses. Some 20 of these have already been erected and are enjoying a
(concluded on page 47)



(With acknowledgments to : Messrs. E. G. Phillips, Son & Norfolk, Nottingham—Consulting Engineers
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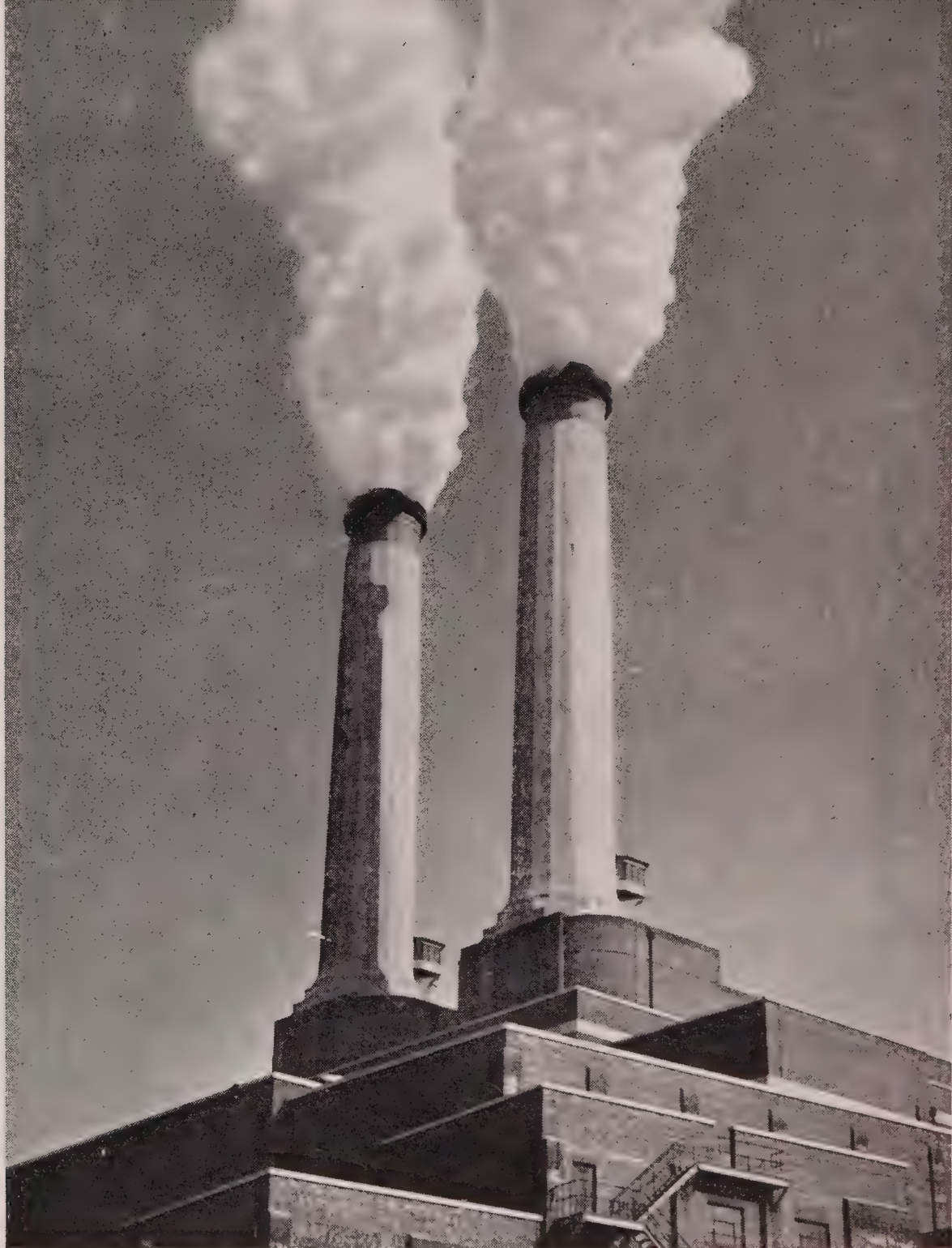


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SMOKELESS AIR

THE SMOKE ABATEMENT JOURNAL



No. 64 SUMMER • 1947

ONE SHILLING

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*Col. W. A. BRISTOW, M.I.E.E., F.R.Ae.S.
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OFFICIAL NOTICES TO MEMBERS

Annual Meeting

Preliminary notice is given that the Annual General Meeting of the Society will be held in the Freemason's Hall, George Street, Edinburgh, at 3.30 p.m. on Wednesday, 1st October, 1947. The Agenda will be sent in due course to all members, representatives of members and associates.

Annual Elections

The election of a President, Hon. Treasurer, Vice-Presidents and Divisional Representatives to the Executive Council will be held during the summer, so that the results may be announced at the Annual General Meeting. Nomination Forms are being sent to all individual members and to the appointed representatives of all other members.

The Executive Council have agreed that the numbers of representatives from each Division to be elected to the new Council, based on relative voting strengths shall be as follows : Scotland, 3 ; Northern Ireland, nil ; North West, 7 ; North East, 2 ; Yorkshire, 4 ; West Midlands, 3 ; East Midlands, 2 ; South West, 3 ; South East, 10.

Conference Resolutions

Any resolutions for submission to the Annual Conference to be held in Edinburgh on October 1st, 2nd and 3rd. must be received by the General Secretary not later than 28th July, so that they may be considered by the Executive Council and, if approved, printed and circularised in advance, to those attending the Conference. This does not apply to any resolutions relating to the Constitution of the Society for submission to the Annual General Meeting, which must be received not later than 3rd September.

Recent Publications

Under the constitution of the Society members and representatives who request a copy of current publications may receive one free of charge. Publications so available, with post-free price of additional copies and to non-members, are as follows : *Proceedings of the Brighton Conference, 1946* (84 pages) (2s.) ; *Report of the November, 1945, Conference on Improved Fuel Burning Appliances for New Houses* (1s.) ; *Report of Joint Conference with Institute of Fuel, London, February, 1945* (8 papers) (2s. 6d.) ; *Smoke Control* (suggestions to local authorities in respect to new installations) (3d., 2s. 6d. per dozen) ; *The Smoke Problem and Science Teaching* (with notes and experiments) 3d., 2s. 6d. per dozen.

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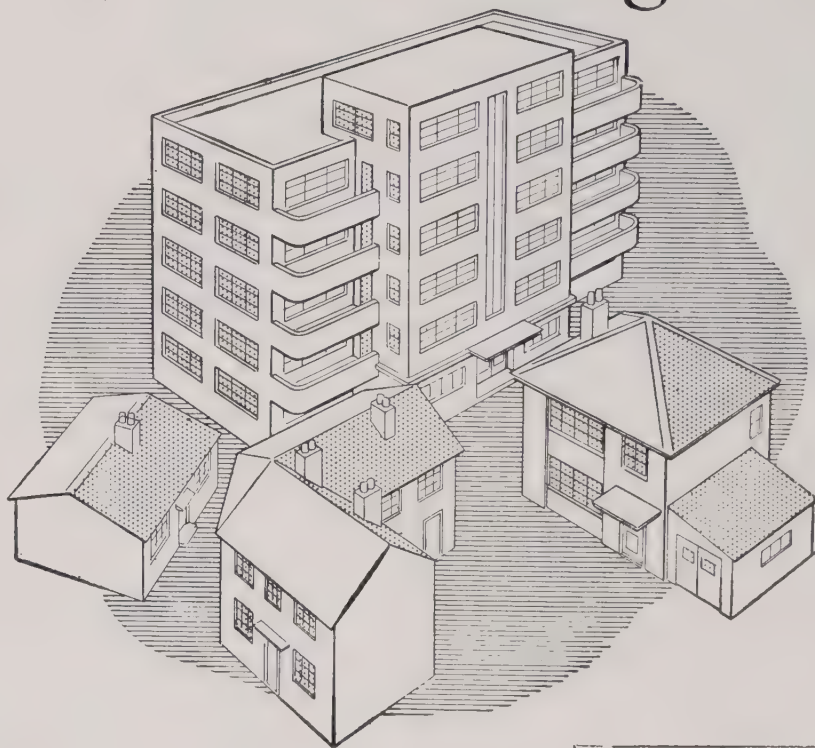
Gratis to members and representatives. Subscription rate : 2s. 6d. per annum, post free.

Smokeless Air is the official organ of the Society, but the views expressed in contributed articles are not necessarily endorsed by the Society. Abstraction and quotation of matter are permitted, except where stated, provided the usual acknowledgments, including the name and address of the Society, are made.

If you are not a member of the Society, and if there is not a membership form enclosed with this copy of its magazine, please write for further information. Specimen copies of other publications and full particulars of the work of the Society and of membership will be sent without obligation. Individual membership subscription from 5s. and special membership for Local Authorities, Corporate Bodies, etc.

The Society's most urgent need is for more members.

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*Ships, towers, domes, theatres and temples lie
Open unto the fields, and to the sky;
All bright and glittering in the smokeless air.*

SMOKELESS AIR

The Glorious Fabrick of St. Paul's

THE lively controversy over the new oil-burning power station at Bankside, opposite St. Paul's, began on grounds of visual amenity, but as the debate went on, in the House of Commons and the correspondence columns of *The Times*, supporting arguments against the scheme were brought in, and the last card in the hands of the critics was that the cathedral would be injured by the chimney emissions of the new station. We warmly welcome all discussion on the dangers of air pollution, even when it seems only to have been a second string, and even if some of the defenders of St. Paul's have not, as far as we know, been over-concerned about the attack from smoke and sulphur already in progress: the attack by the general pollution of the City, of the river, and of London as a whole, that has been in progress since the cathedral first began to rise. As long ago as 1700, Thomas Nourse, in his *Campania Fælix*, wrote of London's smoke that:

"What is to be more lamented than all the rest, the Glorious Fabrick

of St. Paul's, now in building, so Stately and Beautiful as it is, will after an age or two, look old and discolour'd before 'tis finished, and may suffer as much damage by the Smoak as the former Temple did by the Fire."

It is outside the province of this journal to discuss whether the new station will spoil the view of the cathedral in its future setting, or whether it will frustrate the plans for a new Bankside. We are however, concerned with the air pollution aspects of the case, and to begin with we regret that the debate has seemed to create the impression that the prevention of air pollution is exceptionally important only when it is a matter of safeguarding an object of exceptional importance. It would be impossible as well as pointless to argue whether St. Paul's is more precious than the health of London's citizens, or whether in Westminster the Abbey is more important than Whitehall, because things with different values cannot be measured against each other. If a new power station, or any other fuel-burning installation, is liable to injure St. Paul's it is also liable to harm the people who live or work around it, and to inflict many other injuries. To preserve St. Paul's from further disfigurement is one, but only one, of the objects of the N.S.A.S., and the Society wishes public opinion to disapprove of smoke and fumes all the time and not just when the spotlight of publicity is focussed on even the most precious of our national treasures. If we take care of the pence of our civilization the pounds that are the Glorious Fabricks will take care of themselves.

We may, for instance, wonder about the pence of Willesden. Bankside is not the first oil-burning power station. The Neasden station in Willesden is being changed over at the present time, but no one seems to have objected to the danger from the sulphur emissions to the citizens of Willesden and to their homes and industries.

Sulphur in Oil

The pollution problems to be dealt with at the new Bankside station resolve themselves into the prevention of the emission of sulphur oxide gases derived from the sulphur that fuel oil may contain as an impurity. Smoke of course need not be feared from a station of such a kind, where for economy alone combustion control will have to be very precise; and ash emission too should be negligible. The sulphur content of fuel oil varies considerably according to the source of the oil, and some of it may be removed by cleaning processes. It has to be assumed that the oil to be burned at Bankside will be of such a grade that without suitable washing plant the concentration of sulphur gases would be injurious.

The decision to wash the flue gases is a precedent of some importance, not only with respect to oil-burning, but also to the projected coal-burning stations. It is said that the installation of a flue gas washing plant, such as that at Battersea, at present costs, is equivalent to increasing the price of the coal used by 5/- or 7.6d. per ton. To increase the costs of production of electricity unnecessarily would impede smoke prevention as well as many other things, but

policy depends on agreeing on what is, and what is not, necessary. To safeguard St. Paul's has been accepted as necessary. But what else?

Electric or Thermal-Electric?

Finally, there is one matter of importance in connection with the siting of future power stations in general, and that of Bankside in particular, that has been badly overlooked. That is, whether the stations are to be conventional stations for the generation of electricity only, or whether they are to be thermal-electric to provide both electricity and steam of hot water for district heating. If district heating is accepted as desirable we must also accept the erection, *within our cities and towns*, of either thermal-electric or straight steam plants. Only the straight electric station can be erected at a distance from the area of consumption. Many areas in London, and the blitzed City in particular, are especially suitable for district heating, especially by the more efficient thermal-electric system. If this is agreed, then there will have to be power stations in the central districts, and for economy in fuel transport, on the river. If the City itself is to have the advantage of district heat at least one such station must be either at Bankside or near to it, and therefore still near to St. Paul's. A thermal-electric station at Bankside, with washed flue gases, giving district heat to the City, should be warmly welcomed by those who are concerned about the future of St. Paul's.

Mr. Allan Monkhouse, showing what was being done in Moscow by combining electricity and district heat supply, was the only correspondent to *The Times* to raise this point, which was also ignored in the Commons debate. But it is perhaps the key factor in determining whether Bankside should, or should not, have a new power station.

A Problem of Policy

A member of the Society recently resigned because we were not anxious to launch an attack on the Minister of Fuel and Power for his restriction on the use of gas and electricity for room-warming during the summer months. The member, who lives in an all-gas house, saw in this a retrograde encouragement of raw coal, on which, of course, there has been no such restriction of *use*. But the argument soon became tricky—solid smokeless fuels as well as coal are not restricted in use, but they are all very severely restricted in *supply*. Again, the availability of coke has been reduced because some of it is being gasified to give more gas—an expedient that, it could be argued, gives the all-gas house an unfair advantage over the house with coke fires!

What should the Society's attitude be towards the difficulties and anomalies that must arise during such a period of acute fuel shortage, when there is a constant struggle for priority of supply, and it is in the very nature of the situation that someone must go short? It is all a very regrettable obstacle to immediate progress in smoke prevention, for when the chief desire in people's minds is to secure whatever

fuel they can, it is obviously not easy to press the merits of smokeless methods, and such propaganda can very easily create irritation and so be harmful to itself. The advocacy of cake when people are hungry for bread has never been a wise policy. If, to keep to the one example, we complain that Mr. Shinwell is encouraging the use of raw coal, the reaction from the many who have neither gas nor electric fires, and who are anxious about securing enough of any kind of fuel for winter warmth, will be what is well described as a hollow laugh. If the Society is to continue to build up a reputation of responsibility and good sense it cannot afford to fight the transient shadows of crisis expedients to the detriment of its fundamental tasks.

The moral seems to be that we should stand as clear as possible from these annoying but probably quite brief alarms and excursions, and should continue to give all our energies to the shaping of things to come. Do our members agree? We shall be glad to have their views.

Statement on the Fuel Situation

The following statement was prepared and issued by the Executive Council of the Society after the February fuel crisis. It was sent to appropriate Ministers and Government Departments, to other persons and bodies concerned with fuel, and to the Press.

“**H**AVING for many years protested against the gross wastage and misuse of coal that are the principal causes of the smoke evil, the National Smoke Abatement Society sees the present coal situation as an even sharper consequence of the same heedless extravagance. If coal were used with greater efficiency—employing only already proven techniques—the present production could generously meet all requirements and provide a substantial quantity for export. It has for example been estimated that the total quantity of coal that could eventually be saved is in the order of 80,000,000 tons a year.* This is the output of some 300,000 miners. In present circumstances an increase in coal production is a necessity, but should be regarded only as a temporary and regrettable expedient; scientifically, it is more desirable to employ manpower and materials for a limited period in providing the means to use coal more efficiently, than permanently in producing more coal for further wasteful consumption.

“The Society therefore urges the Government, and seeks support in so doing from all interested organizations and persons, to give the highest priority to the formulation of a comprehensive National Fuel Policy for the fullest scientific and efficient preparation and utilization

* O. Lyle “Inefficiency”, paper to Institute of Fuel, March, 1946.

of coal and its derivatives for industry, transport and in the home. Among the shorter term policies required the Society emphasizes in particular the need to :

- (a) facilitate and promote fuel-saving improvements and re-equipment in industry ;
- (b) intensify and extend the already valuable work of the Ministry of Fuel and others on fuel efficiency ;
- (c) require all new fuel-burning installations to receive the prior approval of a competent authority (a principle successfully adopted in other countries) ;
- (d) begin to implement as rapidly as possible the recommendations of the Fuel and Power Advisory Council on Domestic Fuel Policy ;
- (e) begin at once to ensure that for each purpose for which fuel-energy is needed it shall be used only in the form and by the methods most scientifically and economically preferable for that purpose.

“ Finally, the Society, while continuing to regard the smoke evil resulting from the wasteful combustion of coal as primarily a matter of public health and well-being, desires to stress its serious economic consequences, which include a substantial diversion of manpower and materials from the creation of new wealth to unproductive maintenance.”

A New Book on Smoke

NO full-length book on the smoke problem has been published in this country since that of Sir Napier Shaw and Dr. J. S. Owns, *The Smoke Problem of Great Cities*, in 1924. Many new developments and ideas, particularly during the past few years, have increased the need for a new general work on the subject and readers may like to note that in the autumn, Messrs. Faber and Faber will publish *Smoke : The Problem of Coal and the Atmosphere*, by Arnold Marsh. This book is an attempt both to interest the general lay reader, and at the same time to provide sufficient detail and references to make it of value to those more closely concerned with the problem.

In its first part, “ The Burden,” it brings together and discusses the data on which rests the case against smoke. The second part, “ The Restoration of Clean Air,” reviews what has been done, the present position, and the ways and means for securing the progressive abolition of smoke. Appendices survey other forms of atmospheric pollution and the position overseas. The book will contain over a score of photographs and a section of references and bibliography.

Smoke : The Problem of Coal and the Atmosphere will be published at about 12/6d. and copies should be ordered direct from a bookseller in the usual way, and not from the Society.

*A Survey of Firegrates in Temporary Houses in Salford**

By J. L. BURN, M.D., D.Hy., D.P.H.

Medical Officer of Health, Salford

DURING an evening walk in an estate of newly-built temporary houses one was saddened by the sight of smoke staining a sunset sky. Here was a smoke nuisance coming from new houses fitted with the latest types of smokeless grates.

It was, therefore, decided to undertake a survey of the fuel-burning appliances in all the 73 prefabricated houses in the Salford area. Each housewife was interviewed by the smoke inspector or an assistant. A questionnaire (designed to ascertain the fuel used, the cost, the efficiency of heating, and the tenants' preferences) was used.

The houses visited can be divided into two types: (a) the bungalow type with one of two models of recessed open close fires, with back boilers for hot water supply, and which also, in the majority of cases, supplied convected heat to the bedrooms for background warmth.

Type of Fuel Consumed

Approximately 12 per cent. of houses used bituminous coal only for the stoves; about 10 per cent. used coke only; and the balance used a mixture of coal and coke, or used coal for easy lighting. Efforts had been made, verbally and in writing to persuade the tenants to use smokeless fuels, and to increase the supplies available through the local Gas department.

Results of Survey

Hot Water.—On one point there was 100 per cent. agreement—the hot water supply was very good. The majority of the tenants recalled the conditions under which they had lived previously, and warmly welcomed the provision. An example is quoted.

A young married couple with two children under five years of age had previously lived with "in-laws"; to get a hot bath they had to visit the public baths. Every night the children

were bathed in a tin bath filled from kettles and pans. (An unrecorded advantage of new types of grate, including electric and gas cookers, is that on the whole they are much safer than the old grates with the risk of kettles and pans being pulled over by tiny hands.) When in the "prefab." both husband and wife and the children had enjoyed a hot bath every night since they had entered it two months before.

Heating.—About 10 per cent. of occupiers complained of insufficient heating of the living-room—in most cases this being due to a defect of some kind in the stove or its installation. Just over half of the houses fitted with convected heating ducts to the bedrooms in the opinion of the occupiers were insufficiently warmed by this means. Many were worried how to heat the room in case of illness, and some complained of dampness and blamed sicknesses on to this cause.

Costs.—It was considered important to discover if heating costs were higher than in previous accommodation, not wishing to repeat the mistakes made in the inter-war years, when tenants suffered from increased charges (such as rent, as in M'Gonigle's classical investigation for their removal to better housing.

A true comparison of running costs is rendered almost impossible while fuel is rationed, for undoubtedly more solid fuel would be used if it was obtainable. There was sometimes an interesting vagueness, either real or assumed, about the source of supplies received. There was little doubt that most people had received their full allowance.

Running costs of the open/close stoves averaged 4s. 5d. per week, for one make, and 3s. 9d. per week, for the other. Where they were used only at nights and at week-ends the figures were 2s. 9d. and 2s. 7d. Heating costs in the two-storey houses averaged 6s. 1d. per week. Further analysis showed that about two-fifths of the tenants were

* Based on a Paper to a Joint Meeting of the N.W. Division of the Society and the N.W. Section of the Institute of Fuel, at Liverpool, November, 1946.

spending less than 7s. per week on fuel ; about one-third spent 7s. to 8s. per week; about one-eighth 8s. to 10s. ; and one-eighth 10s. to 12s. per week. Lighting and cooking were extra, the charge of 4s. per week included in the rent being considered an average for this.

A reasonable expenditure on fuel from a working-class income appears to be about 7s. per week ; after which there is a danger of other important items in the family budget suffering, i.e. the amount spent on food. A working-class income cannot continue to afford the 10s. and 12s. per week without probable inroads into the amount of money available for food. Some of the couples who are not keeping household accounts may find themselves "on the rocks" soon.

Complaints and Preferences

Eleven people experienced trouble with down-draught and fourteen others had occasional trouble, yet no one had complained to the public health department. With the use of coke this down-draught is potentially very serious. This point alone justified the visit.

Tenants were asked to state which they thought the cleaner, the normal open fire or the new grate. Over 60 per cent. preferred the new grate, 30 per cent. had not noticed any difference, and under 10 per cent. thought the old type grate was cleaner. It was noticeable that those who had thought the old type grate was cleaner had stoves which suffered badly from down-draught.

An opinion was also invited as to which method of heating was preferred, and why. About half preferred the new grate and one-third the old. The rest gave no opinion. Almost identical reasons were given for the preference in either case: healthier, cleaner, tidier, looked better, warmer and safer. Some three-quarters of the tenants knew how to control the rate of combustion. Some tenants felt a need for a means of keeping food warm without having to use electric or gas ovens.

Some Conclusions

Some of the major conclusions drawn from this small survey are :—

- (a) The open/close stove, when properly assembled, fixed and used is an efficient and economical space and water heater.
- (b) Drawbacks associated with the open/close grate are : (i) difficulty of obtaining replacement firebars,

etc. ; (ii) difficulty of access for renewing or repairing any of the enclosed parts ; (iii) the loss of efficiency and rise in fuel consumption when some part is broken, especially the side or backplate ; and (iv) the absence of gas ignition, making coal necessary for a quick and simple ignition. This defect is responsible for much unnecessary smoke.

- (c) The system of providing two solid fuel burning appliances, one devoted solely to water heating, is wasteful and increases costs unnecessarily.
- (d) Houses equipped with multi-fuel grates should be well sited to avoid the possibility of a down-draught. With bituminous coal, smoke in the room is the first indication of a down-draught, but with smokeless fuel this warning would be absent, possibly with serious consequences.
- (e) Shoddy workmanship in fitting has a big effect on the efficiency of the stove. In some cases the materials used for the surround and fixing were of poor quality.
- (f) There is definitely need for further research into the design of grates. We are convinced that the ideal grate has not yet been designed, notwithstanding pretty pictures in the sales catalogues.

The result of the survey showed the foolishness of installing "smokeless grates" and thinking the problem has been solved. Bench tests of efficiency and the performance of a fire in the hands of a negligent or unintelligent person offer bear no comparison. To get more heat from our fuel by modern apparatus a greater degree of understanding on the part of the user is needed. Precise control of draught has transformed the firegrate from a mere fitting into something almost approaching a machine, which although labour-saving and of greater precision, needs intelligence to operate. It also requires careful fitting into an efficient flue.

The survey has emphasised the need for people to be visited to ensure correct understanding of the use of the grates. Printed instruction cards are not always understood and are often lost.

General Remarks

There is before all health departments in industrial areas a vast amount of work

to be done, often beyond our resources of staff and time. It would seem wise, instead of frittering away energies equally over a wide field to devote some special attention to welfare of tenants in the new houses. Visiting can be done by the health visitor, sanitary inspector or the housing visitor. Most of the tenants were glad to see the visitor and there was no sense of "snooping"; as in the case of some other people, they appear to like having an interest taken in them. The curious fact emerges that some people do not complain of real nuisances, contrary to what one is inclined to think when one sits at the receiving end of the postbag. They were apparently content to suffer and only visiting found out what was a justifiable complaint which called for a quick remedy.

Our experience is that three-quarters

of the tenants do not need any more than one visit—they know how to work the grate and have no complaint—the visitor can sense in half a minute that the tenants are happy in their new houses and that from the public health point of view, all is well. On the other hand there are about a quarter of the tenants who definitely need more than one visit—who need help, perhaps a demonstration of the use of the grate. Some may need friendly instruction in housekeeping, cleanliness, and freedom from infestation.

It seems worth while to follow up tenants who are making a new start in these homes, in order that they may become friends and allies in public health, and in order that those who need it may have help in a new and healthier way of life.

National Fuel Service

Is There a Plan?

SPEAKING to the North Western Fuel Luncheon Club at Manchester on June 18th, Sir Ernest Smith, C.B.E., Immediate Past President of the Institute of Fuel, and formerly Director-General of Gas Supplies, Ministry of Fuel and Power said:

"I am deeply concerned at the way in which the Fuel Industries—Coal, Gas and Electricity—are being nationalized, if the functioning of the Coal Board is anything to go by. To me, these industries are but three units of a single National Service—the Fuel Service. The consumer is of primary importance.

"But where is the overall National Fuel Policy? Without a policy covering coal, gas and electricity, chaos inevitably will occur. Instead of a better service at the lowest cost, the consumer will be in no better position than he is to-day. Indeed, conditions may be very much worse.

"There should be formed at once a National Fuel Board to frame a National Fuel Policy. The ideal would then be to nationalize all three industries at the same time. This is not now wholly possible, but a policy for all three agreed on now, would enable the Coal Board to adjust its functioning to the policy laid down. The Fuel Board should not have

functional personnel, but be composed of proved administrators with a wide knowledge of the Fuel Industries—and preferably with some technical training.

"The Gas Industry may not be nationalized for some years. When it is, its present set-up demands that its administration should be very different from that of the Coal Board. The Regions should be as autonomous as possible. The National Fuel Board would prevent everything being done in triplicate in the regions. There should be many common services."

Sir Ernest stated he thought the time had come when National Fuel Research, as represented by the Fuel Research Board and the Research Associations of the Fuel Industries, should be taken from under the wing of the Lord President of the Council and transferred to the Ministry of Fuel and Power. This again would eliminate duplication. To remain as now has no advantages nationally, and is a disadvantage from the point of view of the Fuel Industries.

There would appear to be no policy for the co-ordination of the Fuel Industries.

Nationalization is only a means to make a policy possible—but where is the policy?

Auld Reekie— October

ARRANGEMENTS are now being completed for the Edinburgh Conference of the Society in October. We anticipate that at least as many members and representatives will be there as at Brighton last year, when the number was over 400, and again suspect that the choice of place of meeting is not being unhelpful to the attendance. For Edinburgh is easily the most interesting city in Britain. Fascinating is perhaps a better word, for its unique topography, the dominating castle, the intriguing atmosphere of the old town, the gracious Georgian streets and squares of the new town, the famous Royal Mile, and a Princes Street not yet without hope—yes, Edinburgh has an interest and fascination that is very rare.

The city could indeed be far more. It could be a place of real beauty, and could quickly gain for itself a proud position in civic splendour, amenity and charm that would be without rival in the modern world. It *could* achieve all this, provided that it cleared its atmosphere of the heavy smoke that so afflicts it. “Auld Reekie” is an affectionate old nickname, but there is a hard and disparaging truth in it. Because of its hills and valleys, the cool moist air that drifts in so often from the Firth of Forth, the unhappy situation of its railways and some of its industries, and the smokiness of its household coal, smoke affects Edinburgh in an exceptional degree. And it is so easy, from the Castle, or Calton Hill, or Arthur’s Seat, to look down and see the thick swirling canopy that lies over the town. The stigmata of smoke are everywhere—from the grass and foliage of the Princes Street Gardens to the drab stonework of the many buildings that once had much beauty and gracious dignity.

The Programme

All members and representatives have been invited to the conference, and the complete programme will be sent only to those registered as attending. It is a longer conference than before, and



The Castle, Edinburgh

there will be five full sessions, beginning on the morning of Wednesday, 1st October, and continuing until the afternoon of Friday the 3rd. The Wednesday afternoon will be given over to the Society’s Annual General Meeting. In addition there will be a reception by the Lord Provost and Corporation of Edinburgh on the Wednesday evening, and a conference dinner at the North British Hotel on the Friday evening. It is regretted that both of these events will of necessity be limited in numbers, and tickets will be issued strictly in order of application. Finally, if sufficient delegates are staying over after Friday evening, arrangements will be made for a motor tour on Saturday.

The Agenda

The conference papers will cover a wide field and will make a practical contribution to our own knowledge and to our educational publicity. Area organization for smoke prevention will be the first subject, and cover a question of concern to our own Divisions and to the Regional Committees. The question of domestic smoke will be discussed in what is hoped will be a stimulating way, with eight or nine short contributions by spokesmen of industries and fuels; and as far as

industrial smoke is concerned attention will be given this time to the especially important questions of sulphur and grit emission. The present situation will be described and commented upon on behalf of the Society's Technical Committee, and there will be a paper by G. Nonhebel on what methods are available to prevent such emissions.

The Fuel Research Board is to describe the work they are doing to further smoke prevention, with papers by T. F. Hurley and R. H. Rowse on Fuel and Combustion Research and Smoke Measurement, and one on Atmospheric Pollution Research by Dr. A. R. Meetham. Sir Alexander MacGregor, formerly M.O.H. for Glasgow will be one of the speakers at the final session, when he will review the effects of smoke on health. The other paper will be by Dr. Brooks of the Meteorological Office of the Air Ministry, on Air Pollution and Visibility—with special reference of course to aviation.

The conference is open to non-members, whose presence will be welcomed, and to whom we shall be glad to send further particulars.

THE REGIONAL COMMITTEES

Greater London

The Annual General Meeting of the Greater London Advisory Council for Smoke Abatement was held in the House of Commons on 7th May. Fifty local authorities were represented.

Mr. E. H. Keeling, M.P., was re-elected Chairman, and Alderman T. W. Burden, M.P., was the newly-elected Vice-Chairman. Dr. Andrew S. Shinnie, Medical Officer of Health for Westminster was re-elected Hon. Treasurer and Mr. Clifford Ratcliff, Hon. Secretary.

Following the business meeting a paper on District Heating was read by Mr. S. B. Donkin, in which he made special reference to the scheme for Westminster City Council's housing project at Pimlico.

London local authorities have recently been sent a questionnaire by the Advisory Council on whether there has been an increase, a decrease, or no change in the smoke emission in their areas compared with before the war.

The 71 replies may be summarised thus :

Marked increase	...	...	4
Some increase	...	...	35
No change	...	...	16
Decrease	...	...	5
No observations, etc.	...	...	11

Midlands

Dr. Martine, Hon. Secretary of the Midlands Joint Advisory Council, reports that the fuel position caused the cancellation of a live demonstration of mechanical stokers in action at Messrs. Hopes (Engineers) Ltd., Smethwick, in February.

There was, however, an attendance of 41 local authority representatives at the British Industries Fair, Castle Bromwich, in May. Much of interest was seen, particular attention being devoted to a selection of modern grates and ranges burning smokeless fuels, and to a chain grate stoker capable of burning rough slack smokelessly. Alderman G. E. Beavon, Warwickshire C.C. Chairman, presided at a luncheon at the Acorn Hotel, Erdington, before the visit.

The Quality of Coal

SPEAKING to the North Western Fuel Luncheon Club at Manchester Dr. A. Parker, C.B.E., Director of Fuel Research, of the Department of Scientific and Industrial Research, said that quality in coal was almost as important as quantity.

Coals always contain sulphur, and when burnt a large proportion of the sulphur was carried away in chimney gases to pollute the atmosphere. The Electricity Generating Stations at Battersea and Fulham were under an obligation to remove most of the sulphur from the chimney gases before discharging them into the atmosphere. The processes of sulphur removal were costly, being equivalent to between 5/- and 7/6d. per ton of coal burnt, although for these two Power Stations, coals containing no more than 1% sulphur were selected. The difficulties would be increased and these high costs raised if coal containing higher amounts of sulphur were burnt at these stations.

There was also moisture in the coal. It took labour and power and cost money to transport ash and moisture from the colliery to the user, and also to remove and dispose of the ash after the fuel was burnt.

Reviews

Fuel Abstracts (New Series).

Compiled by the Fuel Research Station, Department of Scientific and Industrial Research. H.M. Stationery Office, £2 10s. per annum.

The Vital Flame, by Compton Mackenzie. British Gas Council Publication, 12/6d.

Houses into Flats. Key to Conversion. Ascot Gas Water Heaters Ltd., 35/-.

The former limited publication of "Fuel Abstracts" by the Fuel Research Station, in duplicated and somewhat bulky form, has now been replaced by a much handier mimeographed edition. This is issued monthly, and the March issue, to refer to one specifically, contains over 200 pages and 760 abstracts. These are classified into twenty sections, and are indexed. All aspects of fuel are included, and one of the sections is for atmospheric pollution.

The publication is a valuable source of information and reference, and, we may admit, is of great assistance in the compilation of our own "Smoke Prevention Abstracts." It is published by H.M. Stationery Office and is obtainable only on the basis of an annual subscription.

It was a brilliant idea of someone in the Gas Industry to ask Compton Mackenzie to write a survey of what is described as "the historical past, the progressive present and the future importance" of the industry. In **The Vital Flame** Mackenzie has written in his own very readable style a book that is much more than a piece of publicity—it is a record of absorbing and permanent interest. The book itself is designed and produced by Adprint Ltd., and in addition to a series of coloured Isotype diagrams contains over two score first-class colour photographs. It is attractively printed and bound, and altogether makes a most distinguished ambassador for Gas.

There is so much useful information in the story that Compton Mackenzie tells that it is a pity that there is no index or that the chapters are not even titled. The first chapter, on the history of gas, is particularly good reading, and we must quote one fact that was startlingly

new to us—in the forties of the last century Oxford Street and Tottenham Court Road in London were supplied by four different companies and from five distinct stations. There can be no doubt about it: there *was* free enterprise in those days!

There is plenty of housing accommodation in this country, but is in occupied houses. New construction cannot for many years give us all the houses we need, and there is therefore great scope for converting existing property into flats. If this is done on a big enough scale it will make a vast difference to the housing situation, but to do it thus demands, in the words of Lord Limerick's foreword to **Houses into Flats**, "not only must the best use be made of available materials, skill and labour in all building work, but also imagination and resource must be brought to bear to the greatest extent in converting for occupation all accommodation that can be made available for that purpose."

Towards the solution of this problem the Ascot Gas Water Heater Company have made a notable contribution, for which they should be accorded the highest credit, by preparing and publishing this book. It is a large and—for these days—most elegant publication, which in addition to authoritative articles contains a number of actual conversion schemes and examples, each fully illustrated with plans of before and after conversion. The part that can be played by gas water heaters is naturally mentioned and illustrated, but this is kept quite modestly incidental to the main, public-spirited purpose of the book.

STOP PRESS

Further to the article on page 67 about New York's new campaign against smoke, a later report states that the money required has not been included in Mayor O'Dwyer's new budget. Other new expenses for health services, notably higher salaries for nurses, have taken precedence. Commissioner Weinstein says that some intensification of smoke abatement could be expected with or without new appropriations. (*If New York was a smokeless city maybe it would not need so many nurses!*—Ed.)

The Scottish Division

Conference at Falkirk

THE Annual Conference of the Scottish Division was held in Falkirk on May 9th last, when the delegates were accorded civic hospitality by the local Council.

There was a very good representation from local authorities in Scotland and the discussion after the delivery of the papers indicated a resuscitation of interest in and an appreciation of the importance of the objects of the Society. The General Secretary (Mr. Marsh) outlined the progress and development of the Society since its inception and said that with proper methods we might, within ten or fifteen years abolish domestic smoke and thereby save millions of tons of coal. Smoke was a sign of wasted fuel and the amount of coal sent into the atmosphere in the form of smoke each year was equivalent to the work of ten thousand miners.

Domestic Appliances

Dr. E. A. C. Chamberlain, Director of Research, Federated Foundries Limited, Glasgow, earned the applause of all present for the excellence of his address on "Recent Advances in Domestic Solid Fuel Appliances." He analysed the developments in the design of these appliances for post-war houses and stated that the major problem of smoke abatement is that presented by the multitudes of small coal-burning appliances which, in the past, because of bad design, have been incapable of burning efficiently bituminous coal, making the emission of smoke unavoidable and wasting eighty per cent. and more of the available heat in the coal. For over one hundred and fifty years improvements in the old fireplaces were possible but never executed because when houses were built by speculative builders for sale or a local authority to let, the deciding factor as to the type of appliance to be fitted was invariably cost, resulting in the appliance manufacturer being enmeshed in severe price competition without the corrective influence on quality or design.

Dr. Chamberlain dealt at considerable length with the recommendations in the Simon Report which deals with

improved heating appliances for domestic purposes, and stated whatever the developments be in domestic heating the immediate problem was the efficient utilisation of solid fuel. The important question for the designer was when was it going to be possible to implement the proposals to fulfil the domestic fuel requirements with smokeless fuel, and in this connection dealt with the advantages and disadvantages of the use of low-temperature coke and the necessity for a clear statement of policy.

District Heating

A paper on District Heating was read by Mr. Seymour, Consulting Engineer, on behalf of Mr. Donald Smith, who was unable to be present on account of illness. Mr. Smith maintained that by the reasonably efficient use of fuel there could be saved thirty to forty million tons of coal per year and the highest efficiency was obtained from large coal or coke-fired boilers with automatic stoking and hot water radiators. He was of the opinion that it was time that the Society came down a little more clearly in favour of methods which have proved their worth all over the world, including this country, rather than fly to embrace the newest advertized fire grate with a slightly different form of fire bar, and stated that he was not impressed with designs that requires skilled attention in the home.

In support of District Heating, he maintained that the concentration into one plant of the load customarily spread over several hundreds or even thousands of small boiler plants would permit of the installation of a really first-class boiler plant of the highest efficiency, with devices for mechanical handling and perfect combustion of fuel. Instead of an average boiler efficiency of forty-five in small boilers perhaps up to 68 per cent. in larger ones, you could expect an efficiency of 78 per cent. to 80 per cent. Mr. Smith referred to his visit to United States of America as a member of a mission appointed by the Ministry of Fuel and Power to study the results of district heating systems in the U.S.A. He saw all types and

sizes of systems, some applying to commercial buildings only, some to public buildings only and some to housing estates. In one small town he visited of about twelve thousand inhabitants, nearly all the houses were independent detached dwellings and he saw only four chimneys in the centre of the town. With the temperature well below zero at night and only rising to seven above after several hours sunshine everyone seemed quite comfortable yet they were getting their heat and hot water at relatively far lower cost than they pay in Falkirk. They have no use for Smoke Abatement Societies; they have practically abolished smoke.

At the Annual Meeting of the Division Mr. Allan W. Ritchie, Edinburgh, was re-elected President, Ex-Provost Robert Irvine, Coatbridge, Vice-President, and Mr. John Traill, B.L., Glasgow, Hon. Secretary and Treasurer.

YORKSHIRE DIVISION

A meeting of Yorkshire members and representatives was held in Leeds, on 20th June for the purpose of considering the formation of a Yorkshire Divisional Council. Sir George Martin, Lord Mayor of Leeds, opened and presided at the meeting, which had an attendance of over fifty.

A resolution to set up the Council was proposed by Mr. John W. Beaumont, Vice-Chairman of the Society's national Executive and Chairman of the West Riding of Yorkshire Advisory Regional Smoke Abatement Committee. He was supported by Dr. Johnstone Jervis, a Vice-President and for many years Hon. Secretary of the West Riding Regional Committee, and by Mr. Arnold Marsh, the Society's General Secretary. The resolution was carried unanimously, and a provisional committee of nine was elected to draft and submit to a further meeting a constitution. Mr. J. C. Goodfellow, Chief Sanitary Inspector for Leeds and a member of the Society was elected as Hon. Secretary to the Council.

It was generally agreed in the discussion that followed the opening addresses that there was a real need for developing smoke abatement in the county, and for securing the co-operation of other organizations, from those of women to that of the farmers. It was agreed that

the Council should work in alliance with the West Riding Committee of local authorities, but that there should be no cause for believing that the work of the new Council would in any way duplicate that of the Regional Committee, as it covered a wider area and its membership was by no means confined to local authorities—it was in fact the only body able to bring together the authorities, individuals, technicians, the industries that can supply the means for smoke prevention, and the many other voluntary bodies working for the community.

NORTH-WEST DIVISION

The smoke problem is having active attention in Widnes and for this reason it was an excellent arrangement to have members of the Health Committee in attendance at the Divisional Council Meeting held in the Widnes Town Hall on 16th May.

After a cordial welcome by the Mayor of Widnes the general business of the meeting was speedily dealt with, including the passing of a resolution urging the attention of the Minister of Fuel and Power to the opportunity now existing for securing economy in the use of fuel for domestic purposes while proving the conditions needed for the progressive abolition of the smoke nuisance.

The dates for two important events were fixed. The Annual Meeting of the Division will be held on the 17th July, 1947, in Manchester and a proposed joint meeting with the Institute of Fuel, also in Manchester, on 14th January, 1948. The place of these meetings to be announced later.

Dr. Baxter, the Chairman of the Widnes Health Committee, then gave an address on what was being carried out at Widnes to reduce atmospheric pollution. A consultative committee had been formed with representatives from the Health Committee, factory owners, builders, Widnes Womens' Standing Joint Conference, and the Electricity and Gas undertakings. Provision was also being made for the training of furnace personnel. Widnes is faced with special difficulties and it must have been obvious to the meeting that the efforts being made were really practical and such which could well be followed by other Local Authorities.

News in Brief . . .

It is difficult not to continue the game originated by Mr. Turner, whose delightful play with crime and grime is reported on another page. We will however, content ourselves with two quotations, which are offered free of copyright to anyone who wishes to use them. First, as Whittier very nearly wrote :

*Against the foulest grime in history
Known in any land or age . . .*

And secondly we are wondering whether to change the quotation that always adorns our first page to another, almost from Wordsworth :

The dupe of folly, or the slave of grime.

Mr. Turner is naturally a member of the Society (we nearly said the Grime Club) and is Chief Chemist to the L.N.F.R. He is also a Fellow of the Institute of Metals, a Member of the Institute of Locomotive Engineers, and an associate Member of the Mechanical Engineers and the Royal Aeronautical Society. ★ Further district heating schemes under consideration include one for a £3 million "new town" at Farley Hill, Luton, and one for the Ernesettle estate at Plymouth. The latter scheme will include factories as well as a thousand houses. ★ The Silver Medal of the City and Guilds of London Institute in Combustion Engineering, has been awarded to Mr. Alexander Gilmour, a student trained in the classes run by the Scottish Division of the Society in conjunction with the Glasgow Corporation and the Ministry of Fuel and Power. The classes are conducted by Mr. Thomas M. Ashford, Chief Smoke Inspector, Glasgow, who is well-known to many members of the Society. ★ Bouquet awarded by *Time and Tide* : "The Smoke Abatement Society claims to have established a reputation for talking sense, a contention borne out by *Smokeless Air*, which is readable and attractively produced. It is to be hoped that it will find readers who will bother actively to support its very sensible aim." ★ Stone from Clipsham, near Grantham, has been selected for the new £1 million House of Commons, work on which is just starting. A member of the suppliers, John Mowlem & Co., Ltd., of London, stated that Clipsham stone was chosen

"because it has proved to be the best for standing up to the ravages of the London atmosphere." An interesting example of British daedalism. ★ There is a moral, too, in the news story of the skipper of a Danish ship berthed at Shields, who was standing laughing at the dense cloud of sooty smoke that was belching from the funnel of his ship. "You know," he said "I would be fined £100 if I allowed this in Copenhagen!" ★ "Millions of tons of coal and a great deal of money now going literally up our chimneys could be saved and made to play their proper part in our battle for economic survival" said Mr. Robert Foot, announcing the launching of a new service, the Powell Duffryn Technical Services. They are to act as consultants to Dominion, colonial and foreign collieries, with big British coal consumers, on all problems of fuel production, distribution and utilisation. Mr. Foot added that "it has been computed that an increase of 15 per cent. in the coal utilisation efficiency of the whole country would produce an addition of £200,000,000 a year to the national income." ★ Rotherham R.D.C. are urging the National Coal Board to take all possible steps to reduce the amount of coal thrown to waste on colliery tips. It is understood that the N.C.B. are considering methods of achieving this. ★ Sickness among racing greyhounds, among the family that owns and trains them, and the withering of trees at their home, near Wokingham, have been attributed by doctors, veterinary surgeons and plant specialists to a brick works in the vicinity. The R.D.C. served the owner of the works with an abatement order. An appeal was made to the Ministry of Works, and now, according to the Press report from which we have culled this story, "the Council has congratulated him on making two million bricks in nine months and told him to carry on." ★ We reprint also, without comment, an extract from a report of the proceedings of the Dunoon Town Council in the *Dunoon Observer*. "When a letter was read from the Smoke Abatement Society inviting delegates to attend a conference at Falkirk, Mr. Heigh, laughingly, suggested that the Manager of the Dunoon Steam Laundry be sent. The letter was allowed to lie on the table."



New York's New Campaign

Not Yet a Smokeless City

ONE the commonest fallacies about smoke in this country is that New York is a clean and smokeless city, in which the use of bituminous coal is forbidden and all rail traction is electric. A very different picture is revealed in the pages of the *New York Times* for the early months of this year. *The Times* has given powerful and sustained support to—if indeed it did not initiate—a great new drive for smoke prevention, by means of excellent leaders, news, and the publication of many letters that show a strong public feeling about the condition of the atmosphere in the city.

The campaign opens with a letter from one who is familiar to us on this side of the Atlantic—"Constant Reader"—who asks: "could you possibly divert a portion of your valuable space from comments about the 'iron curtain' alleged to hang over Europe to the very real curtain that strangles, besmirches, and mars the people and habitations of New York City?"

The Times complies with this request and in an outspoken leader refers to the rise of 40 per cent. in soot and dust deposit between 1936 and 1945, and declares that "what is needed to initiate effective action is the creation of an aggressive civic organization with smoke abatement as its sole purpose, which would gather facts, publicize them, agitate constantly for stronger laws and better enforcement, and carry out a persistent educational campaign among homeowners, apartment houses, industrial concerns, business men, the railroad and harbour boat operators—and not on a local basis only, but throughout the metropolitan region."

The article gives facts and figures of the effects of smoke, among which we may note that when the wind begins to blow from New

York City certain botanical plants in the Boyce-Thompson Institute at Yonkers, fourteen miles away, have been observed to begin to droop within an hour.

Correspondence follows this call to arms, and the following week Mr. Joseph T. Sharkey, majority leader of the City Council, announces that he would introduce a local law within a week to set up a special smoke prevention bureau within the Health Department. Various civic and other public organizations indicate their support of the campaign, and Dr. Israel Weinstein, Commissioner for Health, asks for a preliminary campaign fund of \$117,000, support for which is given by Mayor O'Dwyer. Commissioner Weinstein explains that at present his department has only seven men concerned with smoke, and that most of the budget will be used to set up a new staff of 30 inspectors, a civil engineer, mechanical engineer, chemical engineer, chemist, junior chemist, laboratory assistant, and several clerical workers. *The Times* points out that as smoke probably costs each person \$20 a year, the city, with its 8 million population, could afford to pay \$150 millions a year if it would rid the city of smoke.

Deposit Figures

The Health Department shows how much pollution has increased during the war. In 1936, solid impurities deposited per square mile *per month* at 15 stations in industrial areas of the city averaged 105.6 tons. In 1944 the figure was 162 tons; in 1945, 139.5 tons; and in 1946, 112 tons—a steady return to the pre-war quantity, but still far higher than, for example, any deposits measured in London, where the monthly deposit is in the order of 25 tons. (Care must be taken, however, in comparing the American records with those in Britain. The apparatus and technique used are not identical, and American cities appear to suffer from far higher deposits of natural dust than are experienced here.)

The blame is placed on industry generally, on domestic and apartment premises (now apparently using more bituminous coal and less anthracite than formerly), railroads, harbour craft, and incinerators. Even a district heating station gets into trouble for grit emission. Contrary to what many of us in this country have believed, coal-burning locomotives do run in parts of New York City, and mention is made of the Long Island Rail Road, and of smoke from locomotives affecting the Bronx district.

The next stage in the campaign is a meeting at City Hall on 4th February, convened by the Mayor, and attended by representatives of 40 organizations, including neighbouring municipalities. Dr. Weinstein says that the first step would be to establish standards for new building and factory equipment, to ensure that the right type of heating apparatus is installed; and the second step would be to make persons owning defective installations effect the necessary changes. During January, he said, his department had received 657 complaints concerning heavy smoke and soot.

The meeting sets up no less than ten committees, covering the following phases of the campaign: law and legislation; automotive

transportation, public health aspects, public co-operation, real estate and industry, solid fuels, fuel oils, utilities (i.e., persumably gas, electricity and district heat), railroads, and harbour craft.

Thus enthusiasm for smoke prevention has been stirred up in New York, with public interest, civic and other associations, the Public Health Department, and the Press all pulling together in a big effort to improve conditions. We wish New York the best of luck, and because we may learn much from their technique we hope to give from time to time more reports about the progress of the campaign.

Grime Detection

**The Introduction to an
address on Smoke Pre-
vention to the Doncaster
Rotary Club by T. Henry
Turner, M.Sc.**

YEARs ago I left Bournville, having made an *appointment with Grime* in Doncaster. I had then lived eight years in Bournville, which enjoys one of the cleaner atmospheres, despite its proximity to Birmingham. Since my laboratories have been in London, Glasgow, Darlington and Doncaster, I have been able to notice differences caused by atmospheric pollution in the lives of people in many towns.

A keen amateur in the art of *Grime Detection*, I count among my friends some of the better known *Grime Investigators* and Statisticians. I am an unashamed advocate of *Grime Abatement*, having lived for many years among people who are addicted to Grime.

Dictionaries do not yet contain the word *Griminology*, meaning the study of grime, so I had better explain that the country and seaside of the British Isles were naturally grimeless, free from grime, innocent, guiltless. Unfortunately, certain *griminals*, or people guilty of *grime*, are now perpetual and grave offenders against the law.

These Griminals only appeared in recent times, but nowadays they daily commit the anti-social Grime of coating themselves and their neighbours with thick, ingrained dirt; ingrained

soot; general filth and dirtiness.

The Griminal who fires upon his neighbours millions of particles of Grime, by his wasteful partial combustion of crude, bituminous coal, is probably early aware that *Grime never pays*, for his own chimney deposits soot on the clean linen which his wife has toiled to whiten.

The Griminal is an enemy of Society and of himself, but he is so impoverished in gumption or money that he persists in his *Grime and Punishment*. The more enlightened ones try to mend their ways and I know one of them who even joined the National Smoke Abatement Society, covenanting to pay half a guinea a year for seven years, to assist in the *Prevention of Grime*.

Attention should be drawn to *Grimes against Humanity*, such as the following five which are of local interest.

1. Making your "brass" with the help of men and women who live and work in grime and retiring to the cleanliness of Scarborough or Bridlington without subscribing to the National Smoke Abatement Society, or writing to your M.P. about preventing the dirt which causes drudgery.
2. Erecting an educational building like the Doncaster Grammar School where the windows have to be shut to keep out the smuts emitted by their own chimney-stack, and so teaching the children to accept grime as normal from their youth up.
3. Blotting out the sun with the Royal Infirmary chimney deposits, as a result of puerile engineering design or maintenance.
4. Spoiling the countryside with smoking mine refuse dumps.
5. Blacking out the road with black smoke from the improperly adjusted diesel engine of a ratepayer's bus.

SMOKE PREVENTION

ABSTRACTS

Acknowledgments are made, where required to the Abstract sources indicated.

68. Planning for the Future Coke Market : Work of London & Counties Coke Association. (Gas J., 30 Oct., 1946, 248, 723-4). Coke production figures were the lowest since 1937-8 due to increased manufacture of water gas. Standardization of prices of sized coke was being planned. Dual registration for coke and coal was now allowed for new premises. The shortage of sized coke was deplored. Maximum use of solid smokeless fuels for domestic purposes and reduction of breeze by improving plant was aimed at. The Approved Appliances catalogue was being brought up to date and Degree Day reports were being issued again. Government policy regarding imported fuel oil and the repeal of the oil tax was viewed with concern and a resolution extending the period of agreement of the Coke Association for a further 5 years from July, 1947, was carried.

69. Protection Against Carbon Monoxide—Progress Report to Dec. 31st, 1944. Pease, R. N. (O.S.R.D. Rep. 4898 ; P.B. 15623, 19 Apl., 1945). This final report under contract with Princeton University gives a summary of the work done on the adsorption of carbon monoxide wherever it results as a product of incomplete combustion. An account is given of the development of charcalite drier and of gel-type hopcalite. Carbon monoxide reagents are briefly mentioned. Attention is called to orientation work on C.O. canisters.

70. Method and Means for Precipitating Fog. Vang, A. (U.S.P. 2,414,495/1947). A method of precipitating relatively stationary ground or sea fog, comprising subjecting a foggy atmosphere to controlled sonic vibrations of changing and random frequencies substantially continuously over a period of time sufficient to cause the suspended fog particles to collide and coalesce into larger aggregates which fall to the ground.

71. Smoke Control at Bernheim, Gross, B. (Southern Pwr. Ind., 1946, 64, No. 8, 58-60, 112 ; Chem. Abstr., 1946, 40, 5897). Satisfactory smoke elimination on a boiler subjected to widely varying loads was secured by the

use of steam-air jets, assuring complete mixing of the combustible gases and supplying sufficient air for complete combustion. However, steam requirements were about 2 per cent. of that generated by the boiler, and an excessive amount of steam was used at low and medium loads. This was remedied by controlling the steam used on the basis of the smoke in the breeching. A continuous smoke sample was taken from the breeching and passed through a cell provided with a controlled-voltage electric lamp focussed on a thermopile which actuated an a.c. potentiometer to give step-wise control of the steam to the jets. Steam consumption dropped 50 per cent., and the instrument gave a permanent record of smoke output. Flyash evolution is minimized by furnace baffles and cyclone separators.

72. Domestic Heat Pump Installation, Crandall, A. C. (Mech. Wld., 27 Dec., 1946, 120, 737 ; Elect. Wld., 9 Nov., 1946, 126, 94-5). Natural heat of the earth is transferred into the heating system by circulating through a copper coil system buried in trenches outside the house. The house is on one floor with five rooms and bath and a full basement. Three coils of $\frac{3}{4}$ in. copper tubing are installed outside the house. Valves are arranged to cut-out coil sections as required for experiment. A 3 h.p. electric motor drives a compressor which pumps liquid refrigerant through the tubing and condenser. House air is circulated through the condenser unit and into the air ducts, with filtering and humidity control as in a heating system. In summer the process is reversed and the condenser becomes the evaporator while the earth coils become the condenser, thus removing heat from the house. Changes of air are 6.7 per hour.

73. Menai Straits Tidal Power Plan (Elect. Times, 12 Dec., 1946, 110, 774-776). Mr. F. O. Harber, Borough Electrical Engineer of Bangor, has put forward a plan for making use of the difference in water level between the ends of the Menai Straits which occurs at high tide, in order to generate

electricity. The plan, which is under consideration by a Government department, provides for damming the Straits at both ends and at Trefarthen, thus forming two reservoirs. Power would be generated continuously by discharge of water from the high level to the low-level reservoir. An annual output of 70 million kWh is anticipated.

74. Battery Electric Vehicles, Tucker, P. G. (Comm. Motor, 10 Jan., 1947, 570-2). The advantages of battery electric vehicles for delivery purposes where the work involves a high percentage of stops per mile and the total mileage covered per day is reasonably small are discussed. Comparisons are drawn between electric and petrol driven vehicles from the points of cost and efficiency. Suggestions are put forward for increasing the popularity of battery electric vans.

75. Domestic Fuel Appliances (Hansard, 19th May, 1947.) In the House of Commons, Mr. Wilmot replying to a question, said that it was estimated that about 70 per cent. of 1947 production will be of approved types compared with 40 per cent. in the last quarter of 1946.

Blanket orders had been placed with four firms and further orders were under negotiation.

76. Evaluation of Minimal Prophylactic Dose of Antirachitic Radiation for Rats with Observations of Antirachitic Wavelength Absorption by Smoky Atmospheres. Kay, K. K. and Barrett, H. M. (J. Industr. Hyg. Toxicol, Jan. 1947, 29, 41-6.) In a previous communication (J. Industr. Hyg. Toxicol, 1935, 17, 199) it was shown that smoke, in concentrations normally occurring in urban atmospheres diminished to a considerable extent the antirachitic effectiveness of the radiation from a quartz mercury vapour arc lamp. In the present paper the amount of ultra-violet energy necessary to prevent rickets in rats has been evaluated. Incidental to these measurements the spectral transmissions of atmosphere of wood smoke have been determined in order to test the validity of the results of numerous direct determinations of absorption of solar ultra-violet energy by atmospheric smoke that have been obtained by photochemical and filter methods.

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for an essay on practical improvements of appliances or inventions used or proposed to be used in or about dwelling houses.

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Full particulars of the competitions can be obtained from

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My own looked like
a knock-out, but
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What sort of advice did he give?

First he told me how best to use the classes of fuel I am now getting. Then we went round the plant and he suggested a number of ways in which I could cut down my fuel needs. I soon managed to carry out the suggestions that needed no outside assistance, and plans are being prepared by my consultant for the rest — plans that will undoubtedly enable me to save on my present fuel allocation.

But won’t that take a long time?

Not really. As a matter of fact, my engineer had been pressing me to adopt some of the ideas for quite a while. I wish now that I had followed his advice in the first place.

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2 Helpful publications — special bulletins, leaflets, posters, etc. Ask to see Fuel Efficiency News.

3 Practical training of boiler-house personnel at your factory or in special classes, and awards proficiency certificates.

4 Evening classes and lectures; and films for showing to executives, boiler attendants and staff.

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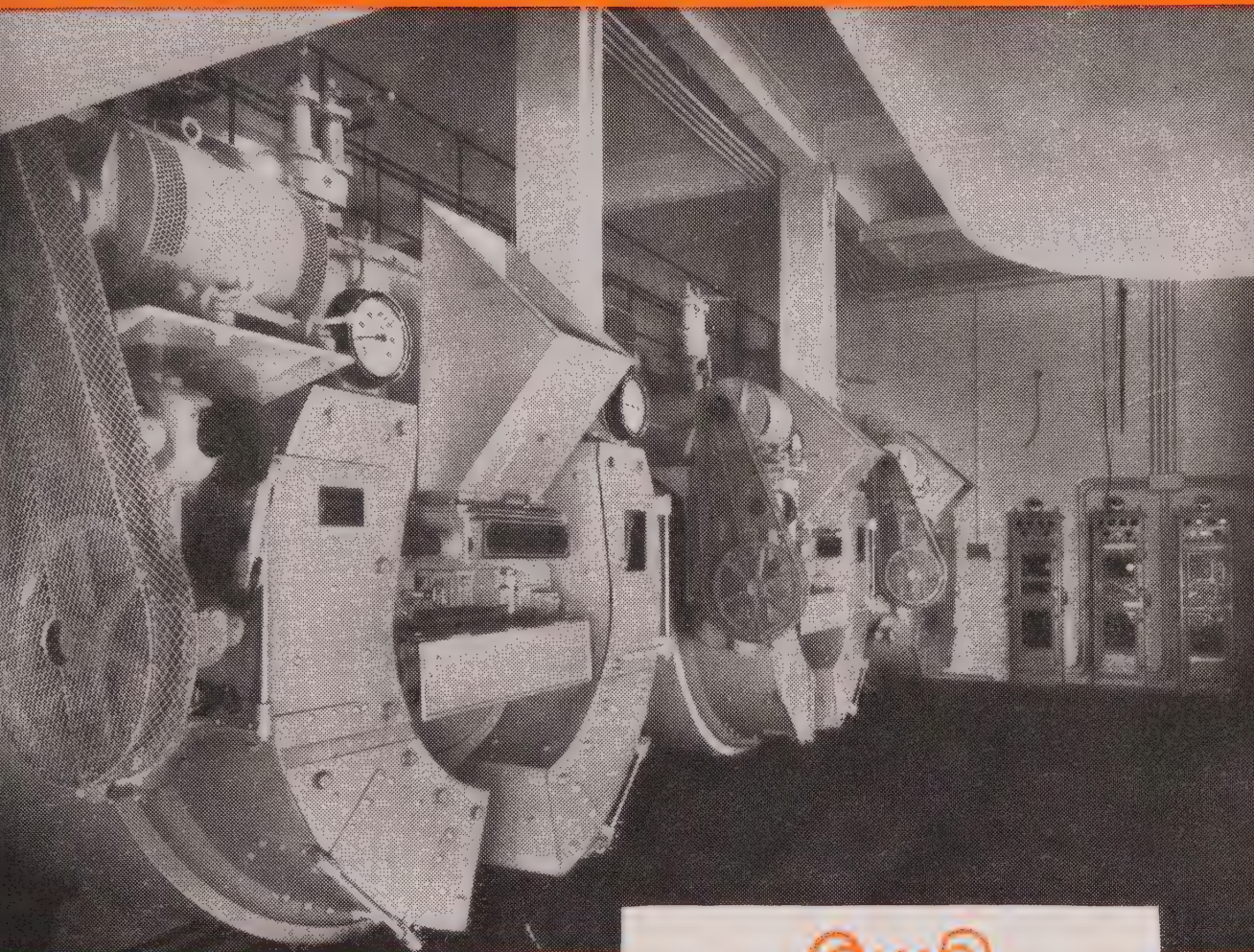
Northern
North-Eastern
North-Midland
Eastern
London
South-Eastern
Southern
Wales
South-Western
Midland
North-Western
Scotland

Government Buildings, Ponteland Road, Newcastle-on- Tyne, 5
71, Albion Street, Leeds, 1
Castle Gate House, Castle Gate, Nottingham
Shaftesbury Road, Brooklands Avenue, Cambridge
Mill House, 87/89 Shaftesbury Avenue, W.1
Oakfield Court, Grove Hill Road, Tunbridge Wells
Whiteknights, Earley, Reading
27, Newport Road, Cardiff
12/14 Apsley Road, Clifton, Bristol, 8
Temporary Office Buildings, Hagley Road West, Birmingham, 17
Burton Road, West Didsbury, Manchester, 20
145, St. Vincent Street, Glasgow, C.2

Newcastle 28131
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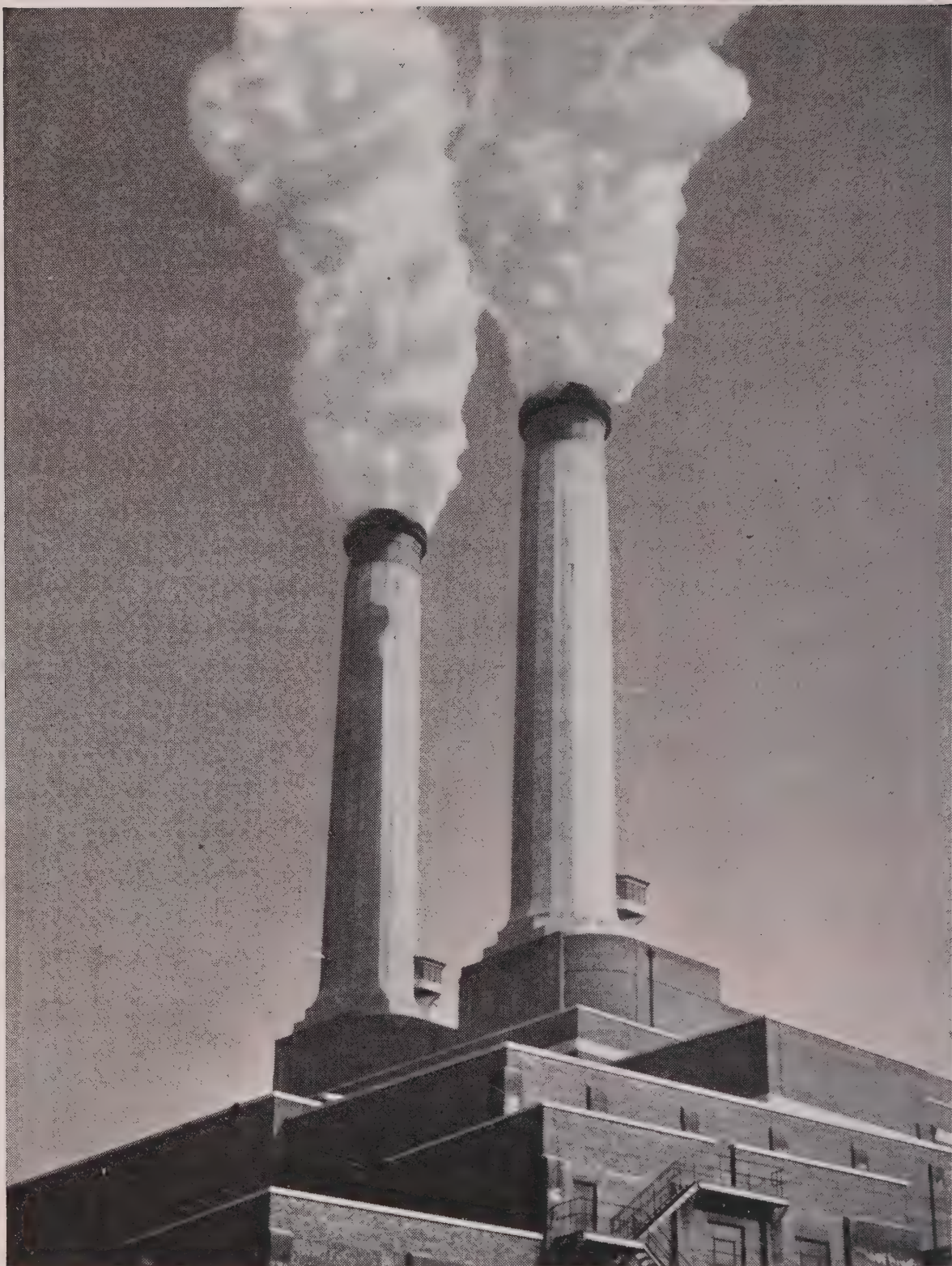
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SMOKELESS AIR

THE SMOKE ABATEMENT JOURNAL



No. 65 AUTUMN-WINTER • 1947

ONE SHILLING

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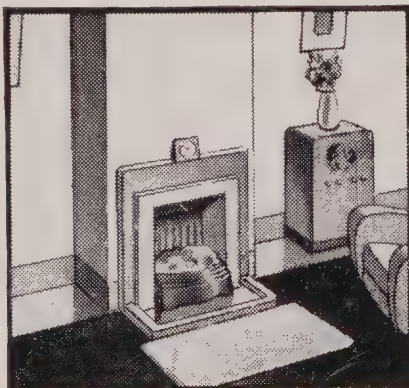
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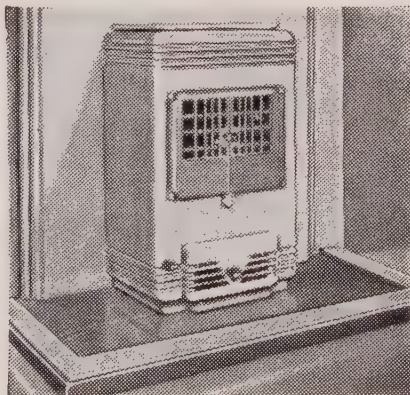
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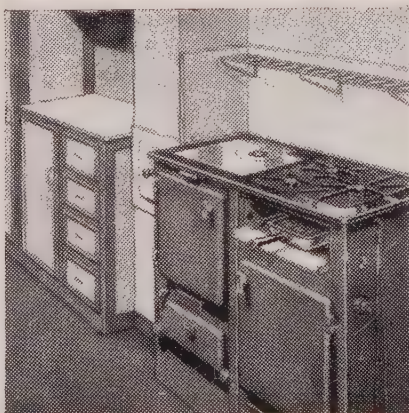
(left)
Smokeless open
coke fire with
hand controlled
heat output.



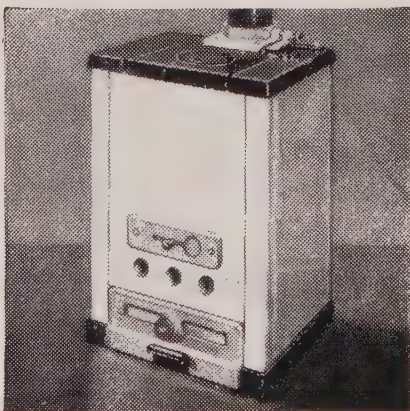
(right)
Free-standing,
continuous-burn-
ing heating stove,
openable type.



(left)
Back-to-back
cooker, with open
fire behind, and
hot water supply.



(right)
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OFFICIAL NOTICES TO MEMBERS

Elections

Following are the results of the Elections announced at the Annual Meeting held in Edinburgh on 1st October :

President : Sir George Elliston (only nomination).

Hon. Treasurer : Sir Ernest Smith (only nomination).

Vice-Presidents : Viscount Cecil of Chelwood, Viscount Samuel, the Lord Bishop of Birmingham, Lord Horder, Lord Simon of Wythenshawe, Sir Charles Reilly, Sir Ernest Smith, Dr. R. Veitch Clark, Dr. Julian S. Huxley, Dr. J. Johnstone Jervis, Dr. R. H. H. Jolly, Dr. H. Osborne, Bailie Dr. Violet Robertson, A. C. Bossom, M.P., H. G. Clinch, E. H. Keeling, M.P., Alderman J. J. Milton, Alderman G. J. Milton, W. Brownhill Smith.

Executive Council. Scottish Division : A Ritchie, Bailie Dr. V. Robertson, J. Innes; *North-West Division* : Charles Gandy, Dr. Metcalfe Brown, Dr. J. L. Burn, Prof. F. E. Tylecote, S. N. Duguid, W. L. Mather, Dr. W. M. Frazer; *North-East Division* : Alderman P. S. Hancock; *Yorkshire Division* : J. W. Beaumont, James Law, James Goodfellow, Dr. J. J. Jervis; *West-Midlands Division* : Dr. W. R. Martine, G. W. Farquharson, C. A. Standbury; *East-Midlands Division* : A. Wade, Councillor A. Mead; *South-West Division* : F. J. Redstone, F. R. Jefford, G. W. Dhenin; *South-East Division* : S. Swift, H. G. Clinch,

R. A. Baskett, Dr. R. Lessing, H. L. Snowden, N. Bastable, L. A. Stroud, E. H. Gray, G. Nonhebel, W. Tillcock.

Amendments to Constitution

At the annual meeting on 1st October, the following resolution was adopted : "That the Constitution of the Society be so amended that : (i) in addition to the present Corporate and Institution Membership with an annual subscription of not less than 10 guineas, and the appointment of two voting representatives, it shall provide for a class of Corporate and Institution Members subscribing not less than 5 guineas and appointing one voting representative only; (ii) Corporate bodies, Institutions and Local Authorities subscribing less than their appropriate subscription for membership shall be Associates, with rights similar to those of individual Associates; (iii) in Clause 16(c) relating to Elections (Executive Council) sub-section (iii) relating to procedure for nominations and balloting be deleted.

Proceedings of Edinburgh Conference

The complete record of the Conference, including the Presidential Address, Papers, Discussions, etc., is in course of preparation. One copy will be sent free of charge to all who attended the conference and, on request, to full members or their representatives. Price to others, and for additional copies, 4s. 6d., or 50s. per dozen, post-free.

1948 Conference

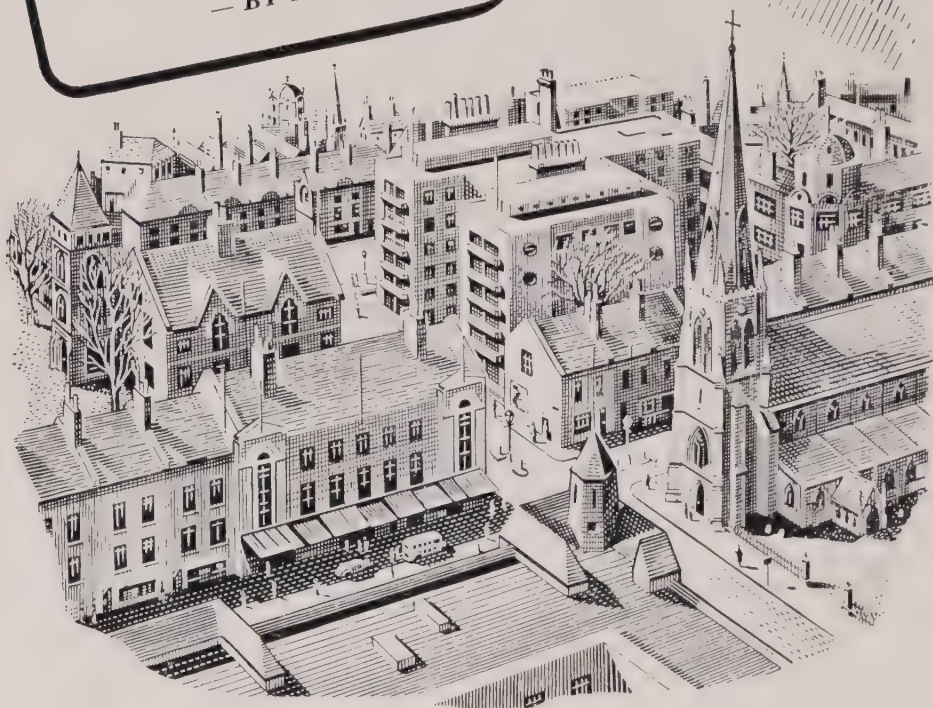
By invitation of the Mayor and Council the next annual conference of the Society will be held in Cheltenham, September 28th to October 1st, 1948.

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All bright and glittering in the smokeless air.*

SMOKELESS AIR

FOR the Society the annual conference marks the end of one year and the beginning of another. It is a time for taking our bearings and embarking on new tasks. In some respects the Society's position was never better than it is to-day. Its membership is higher than ever before, and its income is also continuing to move upwards—steadily if still too slowly. We believe, too, that our prestige, status or goodwill—whatever it should be called—is growing even more surely. There are more demands for our services, more inquiries to be answered, more insistence by members (and by non-members!) that we should undertake this or that project or investigation. This is excellent and most healthy, but it means that a great deal of what we could be doing, what we *ought* to be doing, must perforce remain undone. To attempt and inevitably to fail to do more than is possible only too easily creates confusion, frustration and disappointment. As most of our members know our staff and office resources are very small, and there is a real danger of these things happening. Two courses are open to us—either deliberately to contract our activities and therefore our usefulness, or so to expand our resources that staff can be increased and H.Q. organization stepped up so that we can accept with confidence the new responsibilities that are waiting for us. It is hardly necessary to say that the Executive

Council have determined to attempt the latter alternative, and efforts are to be made to at least double the present annual income.

Local Authority Co-operation

Towards this end a further effort is to be made to bring more local authorities into membership. During the past year nearly one hundred more have come in, making a present total of about 300. Though this is still only one in five, taking all classes of authority into account, it is interesting and satisfactory to note that the population represented by these member authorities is just over one-half of the total population of the country. The further appeal to be made will be linked with an important task discussed at Edinburgh: a survey on a national basis of the nature and incidence of atmospheric pollution. This may sound formidable, and to undertake the exhaustive survey we should really like would indeed be a major operation. What is intended, however, is simply a fairly simple factual questionnaire that we hope will be completed and returned by a high proportion of local authorities. The information we hope to secure, when analysed, may well give us a more detailed and informative picture of what our problem really is than has so far been possible. It may lead the way to a more ambitious inquiry, and it may be of material value to other organizations.

Power Station Emissions

A question giving the Society increasing concern is that whether the many new—and sometimes very large—electricity generating stations now being planned or under construction should be equipped with flue-gas washing plant for the removal of oxides of sulphur. We are more satisfied about grit and ash emission from these stations, for the new technique of electrostatic precipitation combined with multicyclone arrestors should be highly efficient. Sulphur gases are the problem and there is a belief that the higher chimney safeguard is not enough, above all under abnormally adverse atmospheric conditions. The question was discussed at Edinburgh and a formal resolution on the subject was passed, but no one is happy about the position. The answer of the Electricity Commission, that the installation of sulphur removal plant is so expensive that it must substantially increase the cost of electricity, is of course not one that can be brushed on one side, especially as we are looking for further electrification to help to solve some of the most stubborn smoke problems—that of the railways, to mention only one example.

We have recently been assisting in discussions with local authorities concerned over a new station at Carrington, near Manchester, and share with them grave misgivings over the possible effects of the sulphur emissions from a station that will ultimately consume 35,000 tons of coal a week. The Electricity Commissioners are not prepared to install the necessary washing plant from the start, but have agreed to give consideration to representations made by the local authorities *after the station has come into commission*. The Society had already suggested that, to secure factual evidence,

observations should be begun as soon as possible and well before the new station is operating, on the concentration of sulphur oxides in the district, and at a recent conference it was agreed that this should be done.

Absolutely Smokeless

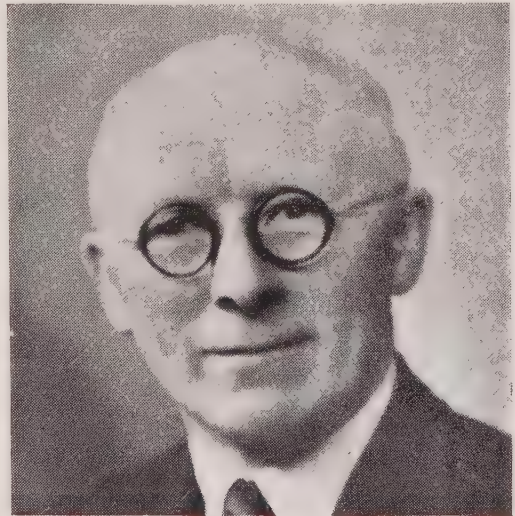
Our frontispiece photograph, at the head of these notes, shows a delightful, well-planned township. The most careful scrutiny will not reveal even the slightest wisp of smoke. It is in fact the ideal for which we have been striving.

But it does not yet exist. It is merely a model. It depicts in short the projected new town at Hemel Hempstead as planned by G. A. Jellicoe, F.R.I.B.A., and formed part of a recent exhibition organized by the Hemel Hempstead Development Corporation. The moral is, of course, that this and the other new towns should, and can, look as smokeless and as clean as their models, and that they have a magnificent opportunity for giving a lead to the rest of the country. We expect all concerned to keep smoke prevention in the very forefront of their planning, and to give their future citizens the most efficient fuel and power services possible. As Sir Patrick Abercrombie said at our conference (see page 10) unless we can secure smokeless air three-quarters of the work of the town-planners will be lost.

Dr. Johnstone Jervis

The recent retirement of Dr. Jervis as Medical Officer of Health for the City of Leeds has meant that he has also had to relinquish the position of Hon. Secretary to the West Riding of Yorkshire Regional Smoke Abatement Committee. At a meeting of the Committee held on 12th September a presentation to Dr. Jervis was made. Mr. Beaumont, as Chairman, made the presentation, which took the form of a silver cigarette case and lighter. The initials "J.J.J." were inscribed on both, and inside the case was inscribed :

" Presented to Dr. J. Johnstone Jervis by the past and present members of the West Riding of Yorkshire Regional Smoke Abatement Committee as a token of appreciation of his services as Honorary Secretary from May, 1925, to July, 1947."



Mr. Beaumont referred to the long and faithful service of Dr. Jervis, who had endeared himself to a succession of members of the Committee during the 22 years of its existence, and who had undoubtedly been its main driving force. They would greatly miss him and they all hoped that he and Mrs. Jervis would live long to enjoy their well-earned leisure.

Edinburgh

The Conference Surveyed

“THE best ever,” was the comment of one delegate at the Society’s annual conference in Edinburgh. It was certainly the largest ever, with a total registration of nearly 450 ; and it was also the longest ever, covering as it did a whole day more than any of our past gatherings. And we believe that the social events were at least as enjoyable and as happy as any we can recall since the conferences began twenty years ago.

If the *raison d’être* of such a conference is regarded as the information it provides and the discussion it promotes, then a comparison of the 80 page volume of the papers presented at Edinburgh with the earlier records will show that “best ever” is an appropriate enough epithet. If anything, the information provided was a little too concentrated for easy perusal at the conference itself and demands more time and attention for its assimilation. The forthcoming volume of *Proceedings* will be an invaluable text-book and reference book, and its publication will undoubtedly add to the Society’s prestige as a responsible and serious body. The technical and scientific information given in some of the papers is of first-rate quality, and the contributions of a more general, and perhaps controversial nature reach a high level of interest and understanding. It was inevitable that some of the discussions should fail to reach the same standards, but even when they did not, they were still of value.

Of the more scientific papers those by Messrs. Hurley, Meetham, Brooks, and Nonhebel were outstanding. Sir Alexander Macgregor’s paper on “Smoke and the Public Health” combined science with public interest in an authoritative and convincing manner, and in the Domestic Smoke session the contributors from each of the industries concerned, replying to a series of questions put to them in an opening survey by the Society’s secretary, produced a most instructive symposium. (It may be possible to discuss these contributions at some length when they have been digested and analysed). The paper by Mr. Edward on behalf of the Ministry of Fuel and Power was greatly appreciated, as was the paper by our own James Law and G. W. Farquharson on grit and sulphur problems. In the opening session on Area Organization it was very fitting that a review of the work and history of our Scottish Division should have been given, and given so well, by its President, Mr. Allan Ritchie.

Not printed beforehand, but to be included in the *Proceedings*, is Sir George Elliston’s Presidential Address, which was topical, informative and stimulating, and which was, of course, read in that genially urbane and delightful manner with which Sir George so readily captures and holds the attention of his audience.

At the Annual General Meeting that followed the Presidential

Address the members were happy to learn that the new Honorary Treasurer was Sir Ernest Smith. Those who know how urgent it is for the Society to increase its resources and who also know what magnificent work Sir Ernest has done for other organizations, are especially gratified that his long association with the Society should now become so much closer and more important.

Resolutions

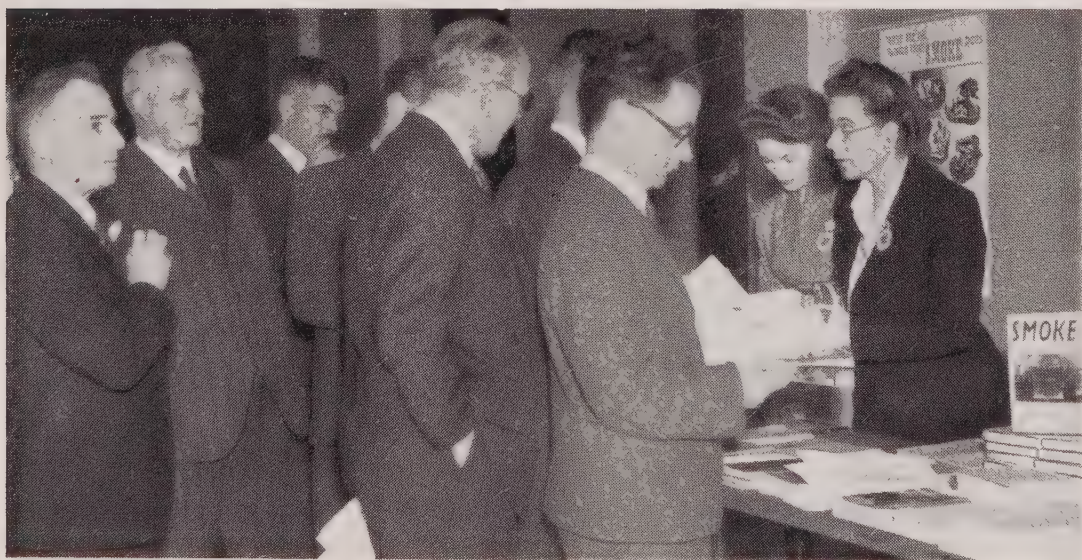
The problem of resolutions at our conference has not yet been settled to the complete satisfaction of all, and the question of procedure will no doubt be considered with some care by the Executive Council during the coming year. On this occasion only two resolutions were adopted, in the following terms :

“That this Conference of the Society views with grave concern the menace to health and amenities caused by the emission of sulphur acids and grit from power stations, blast furnaces, steel works and coke ovens, and calls on the Ministry of Fuel and Power, the National Coal Board, and the Central Electricity Board to take immediate steps to abate these nuisances.

“That the Executive Council be requested to take the necessary steps to undertake a nation-wide survey of the sources and incidence of existing atmospheric pollution and that local authorities be urged to co-operate with the Society with this object in view.”

The first of these, in its original form, was subject to a sharp barrage of amendments and criticism before it was fully approved, and mention should be made of the skilful manner in which the discussion was guided and resolved by Mr. Gandy. Incidentally, at a meeting of the Executive Council held during the conference, Mr. Gandy was unanimously re-elected Chairman, with Mr. John W. Beaumont as Deputy Chairman.

Mention of Chairmen brings one to the sessional chairmen at the conference. They were Principal Smail, of Edinburgh's famous



At the Conference Bookstall.

(Edinburgh Evening News photo)

Heriot-Watt College ; Bailie John Banks, Chairman of the Edinburgh Public Health Committee ; Lord Sempill, whose interest in smoke abatement dates back from the time he was a pioneer airman and was seeing and condemning the smoke palls he saw blotting out our cities ; and finally our Vice-President and former member of the Executive, Dr. R. Veitch Clark. In the Society's early days, when he was M.O.H. for Manchester, Dr. Clark's help and interest were immense, and it was a happy occasion to have him with us once again. Our thanks are due to all the Chairmen, not only for accepting the task we asked them to perform, but in carrying it out, in every case, so efficiently—and efficiency in a chairman is a subtle quality that is only there when it is not noticed !

The Reception

The two social events could not, unfortunately, be attended by all members of the conference. But the 350 people who were privileged to be received by the Lord Provost, Sir John Falconer, and his most charming daughter and Lady Provost, Miss Diana Falconer, had an experience they will always remember. The Lord and Lady Provosts, with their Bailies and Councillors in their scarlet robes, the uniformed, cock-hatted attendants, and the City Chambers themselves, gave a dignity and touch of medieval pageantry to the occasion, although equally appreciated was the warm Scottish welcome and friendliness that was shown to us. They know how to make you feel at home north of the Border !

In return we welcomed the Lord and Lady Provost to our informal dinner on the Friday evening. This too, our first conference dinner, was a most enjoyable affair and made a worthy end to a very full three days' work. The speeches were excellent, and a last minute guest we were privileged to invite was Sir Patrick Abercrombie, who was in Edinburgh for a town-planning conference at which the plans for a new Edinburgh had been shown and discussed. This, coinciding with our own conference, naturally give us the opportunity of stressing the fact that without the abolition of smoke these plans could never fully achieve their ends. Sir Patrick, speaking at the dinner declared, indeed, that without an ending of smoke, three-quarters of the work of the town-planners would be wasted. His short (and impromptu) speech, with those by the President, the Lord Provost, Lord Sempill, Bailie Banks, Sir Ernest Smith and Mr. Gandy, gave the conference an unusually happy ending.

The coach tour to Callender and Loch Earn on the Saturday was, in a way, a post-conference event. It was a perfect autumn day for seeing some of Scotland's finest scenery, and having said that, one has said all that is necessary.

Press reports on the conference were good—as good that is as one can expect in these days of limited space, and some editorial comment, especially in *The Scotsman*, were most gratifying. The B.B.C. reported some sessions on its news bulletins, and some of the papers have been recorded at length in the technical journals.—*Onlooker.*

Does Smoke Cause Cancer ?

By a Medical Officer of Health

Studies on Medical and Population Subjects, No. 1. Regional and Local Differences in Cancer Death Rates, 1947. H.M.S.O. 1s. nett. General Register Office.

ANY report which bears the imprint of the General Register Office commands our respectful consideration. Particularly when the author is Dr. Percy Stocks, and the subject includes a study of respiratory cancer death rates, then close attention by all engaged in scientific study of the smoke problem is indicated.

Whilst lung cancer rates are of special interest to us, the report (moderately priced at a shilling) deals with cancer of all sites. There are curious differences in cancer incidence in differing countries and in different regions in the same country. As local and national conditions and habits vary so much it is of obvious importance to study these differences, and see what light is thrown on the causation of cancer. For instance, cancer of the breast in England was 10 times that of Japan, although for female reproductive organs there was little difference. Again there is a large excess of deaths certified as stomach cancer in North Wales. Fresh milk and vegetables are little used by the population. It may be that peculiarities in diet and methods of cooking, e.g., use of cooking oils and the frying pan, as Dr. Stocks has suggested in a previous report *may* cause more gastric irritation.

As cancer kills over 70,000 people in England and Wales every year—causing more deaths as the Registrar General points out than those from all forms of air attacks in six years of war—the problem is obviously important.

For a long time the smoke abatement movement has been handicapped by the absence of sound evidence from vital statistics of the ill-effects of smoke. Statistics frequently quoted in our literature and at our conferences (even as recently as at Edinburgh, 1947) do not bear detailed scrutiny. The abstractor once asked some of the most prominent statisticians in this country of the evidence they accepted as proving

the deleterious effect on life and health caused by smoke. Their replies showed how few real facts we know; one replied that the only satisfactory figures of which he was aware were those obtained by W. T. Russell* in a study in 1924 of statistics in the year 1875.

It is easy to show that in time of smoke and fog deaths may increase. But is the increase of statistical significance? Often comparisons are made without any real basis between death rates of urban and rural areas, and no account is taken of factors which may influence death rates, such as the presence of localised outbreaks of influenza or respiratory infections; the temperature or humidity; adequacy of confirmation of diagnosis, differences in death certification, etc.

Up to the present the relationship between smoke-laden air and *cancer* has been uncertain; a position succinctly described by Arnold Marsh.† I quote—"one of the injurious constituents of coal smoke is tar, and it is known that certain forms of tar are capable of inducing certain forms of cancer. There is also the well-known chimney-sweeps' cancer, which is purely an industrial disease caused by abnormal contact with soot over long periods. In addition, some research workers have suggested the likelihood of smoky air being a factor entering into the causation of the disease."

The publication of Dr. Stocks' studies is an important landmark in statistical evidence on this subject. Here are some facts abstracted.—There were higher cancer death rates in urban than rural areas in 1921-30.—Amongst women also the percentage of lung cancer was twice as great in London as in rural districts.—In 1936 lung cancer in males showed a steep downward gradient from London through large and small towns to rural areas. Dr. Stocks finds one factor—the mean annual hours of sunshine—"significantly correlated with death rates from

* Russell, W. T., "Lancet," 1924, 2, 335-339.

† Marsh, Arnold, "Smoke—The Problem of Coal and the Atmosphere," 1947. Faber and Faber, London.

lung cancer, bronchitis and tuberculosis, for which the strength of the correlation appears to be much greater for lung cancer than for the other lung affections." "The cause of the differences in annual sunshine is partly geography, partly climate and partly smokiness of the atmosphere. Smokiness of atmosphere intensifies the effects on total sunshine of the shorter day and excess of cloud over the northern towns particularly, and the three factors probably contribute almost equally to the 25 per cent. northern deficiency."

For us, the most important conclusion by the author is that he finds the only adequate explanation of a study on the correlation of lung cancer death rates and the annual hours of sunshine is that "either smokiness of atmosphere is an important factor in itself in producing cancer of the lung, or sunshine is an important factor in preventing its incidence."

The mean annual hours of sunshine are given in some detail. Poor Bolton has but 975 hours compared with Blackpool's 1,368. Manchester and Salford have 983 hours whereas Birmingham has 1,158. Tottenham's hours of sunshine are given as 1,235, compared with 1,473 in Cardiff, and Brighton's 1,660.

Of course there are many complexities and mysteries. Why should Manchester and Liverpool rates be so different? For example, for females over 65, deaths per million living, Liverpool has a rate of 494 and Manchester of 596. There are many curious differences in cancer death rates between the cotton and woollen towns of Lancashire and Yorkshire. There are significantly higher cancer death rates in Sheffield than in Stoke; in Nottingham than in Bristol. Why?

Another interesting point is that cancer death rates of the alimentary tract and oesophagus vary significantly with the occupational and social class, but cancer of the lung does not. Cancer of the larynx (but not of the lung) seems to vary with the environment.

The increase in lung cancer is certainly disturbing. A generation ago a case was almost a curiosity, whereas for men aged 45-64 the percentage of deaths has been over 7 per cent.

Studies of the effects of atmospheric pollution on health are difficult for

there are so many factors associated with urbanisation which are not directly due to atmospheric pollution. Where smoke is present there is generally a poorer standard of cleanliness, of hygiene and of life of the people, so it is difficult to compare morbidity or mortality rates with those of people more fortunately situated. Occupational effects can be eliminated by taking female rates, but this eliminates only one of twenty possible fallacies. Many have tried to compare death rates in holiday resorts with those in heavily polluted places like London, Manchester and Sheffield, but obviously real comparison is difficult, for climatic differences and the size and age of the different populations vary so much. Hence the unique help which the Registrar General can give in collecting, classifying and analysing death rates on a large scale over many years, with expert help in avoiding the numerous statistical pitfalls.

The instrument of refined statistical method is shedding some new and welcome light on the grave national problem of the relationship of smoke and cancer.

Advances in Public Health

IN his new book **Recent Advances in Public Health** (London, Churchill; pp. 409, 25s. net), Dr. J. L. Burn, Medical Officer of Health for Salford, covers a remarkably broad field of subjects. His survey is divided into three main sections, Public Health and the Individual, the Community and the Environment, and in all there are no less than 37 distinct chapters. One of these is properly devoted to smoke prevention, in which, in its necessarily limited space, the author gives a clear and skilfully written outline of the problem. The domestic and industrial problems are reviewed, and there is a summary of the main effects of smoke. The importance of smoke prevention in health education is well stressed, and an up-to-date account of practice in the U.S.A. is included.

Dr. Burn's book will, of course, be necessary to all Public Health Officers, and we would recommend it to those

who are interested in local government work generally as well as to laymen who wish to be well-informed about progress in this important part of our national life. For our own part,

although the chapter on smoke was our first concern, we found other chapters, dealing with subjects about which we knew little, to be of absorbing and profitable interest.

“P. F.”

A Review of the Pulverized Fuel Conference

EVEN our non-technical readers will be aware of the growth of the use of pulverized fuel in recent years, and will have appreciated how this is more and more changing the nature of the industrial atmospheric pollution problem from that of carbonaceous smoke to that of grit or fly-ash. Smoke prevention can usually be ensured by insisting on the correct control of combustion, and this is normally of economic advantage to the user; grit from pulverized fuel can, however, be prevented or minimized only by using coal containing as little ash as possible, and by installing grit arrestors of one kind or another—both remedies adding to the cost of power. “P.F.” is obviously of the greatest interest to all who are concerned with the abolition of air pollution.

It is a big subject, and was discussed exhaustively at a special conference held at Harrogate in June last, under the auspices of the Institute of Fuel. The papers presented are published in a book by the Institute, with a supplementary volume and a volume of discussion to follow. (Pulverized Fuel Conference, Inst. of Fuel, 18 Devonshire Street, London, W.1, £2 2s.). The scope of the conference papers is shown by the fact that they number no less than 54, and that they run to 900 pages. Every aspect of P.F. is covered, and altogether the volumes constitute a remarkable achievement on which the Institute is to be congratulated.

Unless one wishes to learn everything that can be learned about pulverized fuel, the papers are not as formidable as at first sight they appear. The reader can use the book either as a reference book only, or can devote himself to whatever group of papers

most interest him. Naturally only a few are concerned with the prevention of the emission of solid matter into the air, but they cover the field most usefully and in adequate detail. Mention may be made of the first paper of all, on the history of pulverized fuel, by Dr. P. O. Rosin, a paper by P. A. H. Elliott on the influence of legislation on the use of P.F., and papers on the fuel itself and its preparation by Dr. E. T. Wilkins, W. F. Sparks and Dr. R. Lessing. More than half-a-dozen separate papers deal with dust extraction, electrostatic precipitators, dust recovery, the Modave arrestor, and so on. Professor David Brunt gives a review of the question of the dispersal of gases and dust from tall chimneys.

One paper among those on P.F. in use, describes a successful bonus scheme for boiler firemen introduced by the Lothian Coal Company. This is of such interest that we hope to reproduce it in full in an early issue.

Statistics given in P. A. H. Elliott's paper, show that over the past 25 years there has been an increase in the consumption of P.F. of 2 million tons every five years. 9 million tons were burned in this country in 1945, and it is estimated that by 1950 the amount will be 15 million tons. Clearly, if we are to eliminate grit entirely from the atmosphere more attention will have to be given to coal preparation and to flue-gas cleaning—not only in large, but in medium and small, installations. This conference report will for a long time be an important source of authoritative information on the subject.

All the papers are briefly but adequately abstracted in the October, 1947, issue of the Journal of the Institute of Fuel—a most useful aid to digestion.

“SMOKE”

Reviewed by
Sir George Elliston, M.C.

Smoke : The Problem of Coal and the Atmosphere,
by Arnold Marsh. London, Faber and Faber ; pp. 306
and illustrations ; 21s. net.

THE Smoke problem has existed ever since coal began to take the place of wood as fuel for industrial and domestic heating, but until the coming of the steam engine the nuisance was localised and relatively insignificant. As the industrial era progressed the smoke nuisance grew, reaching its peak in the latter half of the last century. Since then there has been some improvement, because the gross emissions of dense black smoke from factory chimneys have been dealt with under statutory powers, but though the obvious nuisance from individual chimneys has been largely abated, the sum total of atmospheric pollution has actually increased, not only because of the continued growth of industry, but also by reason of the increase in the population and therefore of the number of dwelling houses, each contributing to the pall of smoke over our towns and spreading for many miles into the surrounding country.

Much has been said and written in many places over many years on the smoke nuisance, but there has existed a need for a comprehensive work on the whole subject, and this, Mr. Arnold Marsh, the General Secretary of the Smoke Abatement Society, has provided. His book is divided into two parts. Part I, “The Burden,” is the indictment of the smoke nuisance. Here are no platitudinous generalities, but hard scientific facts fully documented, yet clearly and interestingly set forth. The author traces briefly the history of coal, how the coal measures were laid down and how the various types of coal, lignite, bituminous coal and anthracite, were formed, how coal first came to be used and why it was originally called sea coal.

As early as 1257, coal was being used in the provinces and Queen Eleanor was unable to remain in Nottingham because of the smoke. In 1306, a royal proclamation prohibited artificers from using coal in their furnaces and commanded them to return to the use of wood and charcoal. It was not till the 15th and 16th centuries that coal began to be used in domestic fires and not till the 17th century that the domestic coal fire was adopted by polite society. As early as 1595, one Thomas Owen proposed to transport smokeless coal and anthracite from South Wales to London in order to help rid the Metropolis of smoke. In 1661 was published John Evelyn’s “Fumifugium : or the Smoake of London Dissipated.”

But none of the early attempts at smoke abatement came to anything, and the nuisance grew as industrial expansion took place. “Where there’s muck there’s money,” became a proverbial saying.

In what Marsh calls the first coal age the use of coal was entirely unscientific. It was regarded only as fuel and it is only in comparatively recent times that its full potentialities have been recognized.

The author next discusses combustion in its relation to smoke, and shows that, with present methods of burning raw coal, each year in Great Britain about 3 million tons of solid matter are thrown into the air, together with about 5 million tons of sulphur dioxide, which is equivalent to about 8 million tons of sulphuric acid. A chapter on atmospheric pollution naturally follows; then chapters on the effect of smoke on human health; on plant life; on property, stonework, metals, fabrics and works of art; on the squalor of smoke and the cost. Various estimates have been made in this country and the U.S.A. of the cost of smoke to the individual. They vary from £1 to £4 per head, per year. To this must be added the loss from waste of fuel estimated to be at least £50 millions a year.

Finally, the effect of smoke in the interruption and added risks of modern transport, particularly aerial transport, are considered.

The Restoration of Clean Air

Part II, "The Restoration of Clean Air," deals with the efforts that have been made to abate the smoke nuisance, the reasons for the very limited degree of success which has attended such efforts; and plans and prospects for the future. So far, only industrial smoke has been tackled and the best that has been achieved is byelaws which state that the emission of black smoke for more than 2, or in some cases 3, minutes in any period of thirty minutes shall be deemed to be a statutory nuisance.

Under the Public Health Act, 1936, building bye-laws may require the provision in new buildings, other than private houses, of such arrangements for heating and cooking as are calculated to prevent or reduce the emission of smoke. But the Ministry of Health has been unable to approve any proposals for such byelaws or to frame bye-laws themselves. No attempt has yet been made to control by legislation the nuisance from domestic smoke.

Mr. Marsh is well aware of the difficulties, and devotes a whole chapter to the problems of industrial smoke and another to the problems of domestic smoke.

In regard to smoke from steam-raising plants, Mr. Marsh says the questions must be asked: is it possible to carry out the operations by electricity or gas?; can smokeless fuel be substituted for raw coal?; can heat and power be obtained from a central source when smokeless conditions are assured?; is the plant the best of its type for its function, and is it adequate in capacity and maintained and operated efficiently? Apart from the raising of steam, raw coal is used in certain industries such as pottery and tile works and iron and steel works, and in these the elimination of smoke presents special difficulties. The problems of railway smoke and of the emission of grit and sulphur are also considered.

In regard to domestic smoke, the author observes that there is no prospect of a completely smokeless open coal fire. Efforts are being

made to develop multi-fuel appliances which will burn bituminous coal with a minimum of smoke, or any of the smokeless fuels. The changes will take time. At present, the householder must burn whatever fuel he can get, but modern multi-fuel appliances should be insisted on in all new houses, and ultimately it would pay the country to subsidize conversions in existing houses. Meanwhile, the production of smokeless fuel must be developed with all possible speed.

District heating should be regarded as a fuel utility comparable in function with the existing services of gas and electricity.

A system of control of the use of bituminous coal similar to those in operation in Pittsburgh and St. Louis, U.S.A., is visualized.

Recognizing that smoke abatement can only progress step by step as suitable fuels and efficient appliances become available, Mr. Marsh is a strong advocate of the establishment of smokeless zones and of their extension as rapidly as may be practicable in each area. He believes in regional rather than local authority control, particularly where the approval and inspection of fuel burning installations is concerned, and he emphasizes the importance of educating public opinion in the matter of individual responsibility for the smoke nuisance.

Mr. Marsh knows his subject from A to Z. He believes in the practicability of the restoration of clean air, but he knows all the difficulties, and his scientific training and outlook ensure that his enthusiasm does not lead him into making impracticable suggestions.

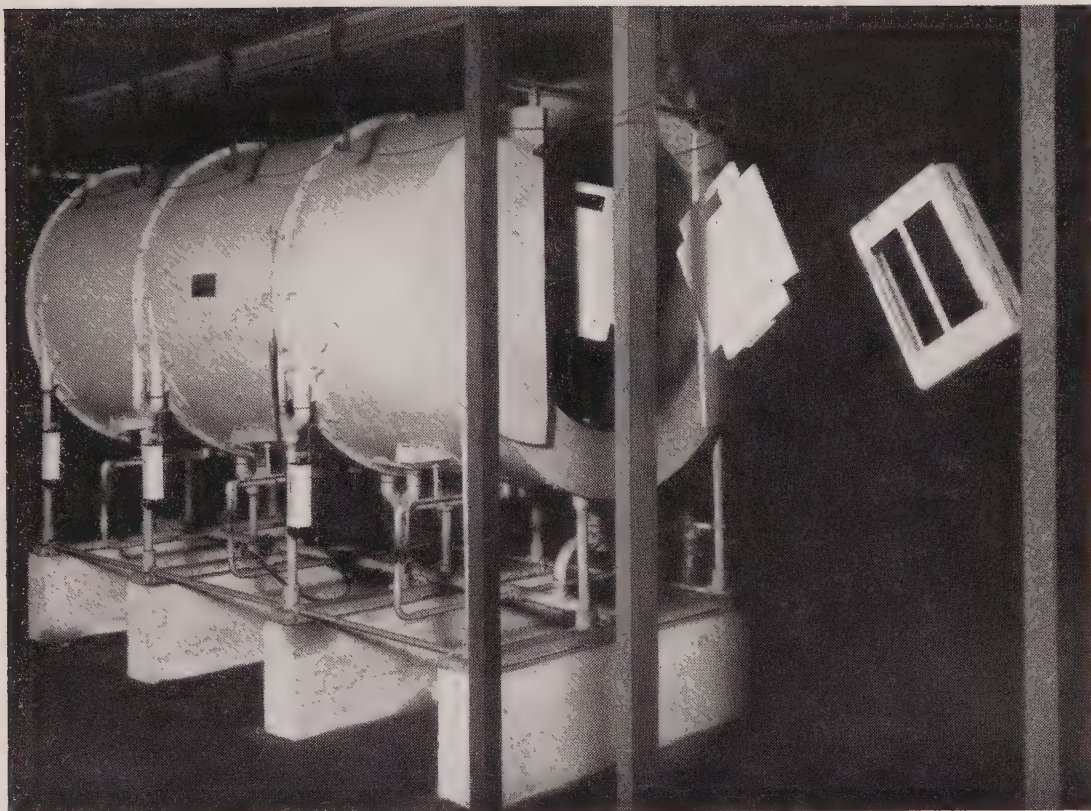
"Smoke" should certainly be in the hands of all who are interested in the restoration of clean air, whether as technicians, administrators or propagandists. It has the remarkable quality of being neither too simple for the first mentioned, nor too difficult for the last; and even the general reader who wishes to be easily and authoritatively informed on one of the great social problems of yesterday, to-day and to-morrow, will not be taken out of his depth and will read the book with pleasure and profit.

A word must be said about the illustrations, most of which are photographs well chosen and exceedingly well reproduced.

Conference on Cement Works Dust

AN important conference of local authorities affected, and other organizations, convened by the Dartford R.D.C., was held in Dartford, Kent, on 24th October to discuss the widespread nuisance caused by dust emissions from cement works on Thames-side, both in Kent and Essex. The meeting was remarkably well attended, and was emphatic and unanimous in its condemnation of the conditions prevailing in the area.

A committee was set up to investigate the problem, to secure evidence, and to consider ways and means for action. Two Members of Parliament, Messrs. G. D. Wallace and N. Dodds, were present and promised to assist in bringing the case before the Government or Parliament. The N.S.A.S. was represented and its fullest co-operation was promised. It was clear from the discussion that convincing evidence of the material injury to health and amenities, and economically, will be forthcoming. Mr. Ernest James, Clerk to the Dartford R.D.C., was elected Secretary to the committee.



WHAT IS INFRA-RED?

PRODUCTION in many industries is being speeded by the development of infra-red heat for drying and other purposes. Infra-red is simply a variety of radiant heat, in which the temperature of the surface of the heat generator is not high enough to cause the red or other visible rays to be emitted. It may be described as dark or medium-temperature heat.

Recent important developments, using gas as the fuel, were illustrated in an exhibition organized by the British Gas Council at Gas Industry House, London. Our photograph shows a typical make of infra-red tunnel used for drying purposes—as shown it is drying the painted or enamelled parts of electric fires and radiators which, suspended on a slowly moving conveyor, pass through the tunnel.

The inner surfaces of such tunnels are mild steel black or dull panels, heated by non-bunsen type gas flames, and with an outer insulated surface. The heating plates may be either semi-cylindrical, or in the form of flat plates that can be individually adjusted for different requirements and various designs of tunnel.

The great advantage of this new type of heating is the reduction in time required for drying operations in paint and other metal finishing operations. Thus, bedstead frames by other methods require 10 hours to dry; by infra-red it is done in 8 minutes. For sections of prefabricated steel houses the time can be reduced from 60 to 4 minutes, and on a smaller scale, spectacle frames from 60 to 2 minutes. An experiment carried out by one firm, showed that even the drying of bank notes, an operation that has to be done without injuring the texture of the paper or the colour of the ink, could be achieved in 40 minutes, as against the old method of stacking in hot rooms for four days. Many other drying, annealing and curing processes are being carried out, or are being experimented on, with infra-red.

The Midlands Joint Advisory Council met recently in Oldbury and saw chain-grate stokers in production and action. The fuel used was a poor slack, obtained from local pit mounds, and the complete absence of smoke from the stack was regarded as most impressive.

Smoke and Dust in the Mining Towns

Through the Smoke Cloud

By Wilfrid Brooks

We reprint, with acknowledgments, part of an article that appeared in the August issue of "Coal," the magazine of the N.C.B. The author is a South African journalist who gave up his job in Fleet Street to work in a Durham mine because he felt a call to help in the new Battle of Britain at the coal-face. His impressions are followed by extracts from a paper surveying the smoke problems of the colliery districts from another point of view.

"YOU won't find that in many collieries."

We newly-arrived trainees were standing at the bottom of the pit-head chimney, looking at a large steel box-like structure sheltering a railway wagon. From a chute above the wagon slid a stream of soot and coal-dust, some of which occasionally blew in our faces and made us cough. "It all comes from the smoke," said the instructor, proud of the whole contrivance. "Rather than allow the muck to go up the chimney and blow over the countryside, the owners installed this cleaner. The smoke must be pretty dirty: as you can see, a good deal of the stuff comes from it—about two wagon loads a day."

Having seen what the smoke of thousands of chimneys does in the East End of London, I was impressed. Here, surely, was a sign of the times.

That night a gale blew up, sweeping the moors and whistling and screeching round the colliery and the hostel where I lived. I woke to find everything covered in a black, flour-like dust, unbelievably filthy. Outside, a thick black fog drove over the village and I could scarcely see the houses only a few hundred feet away. The fog got into your nose and throat; you had to half close your eyes. It seemed to be coming with the wind, blowing directly from the colliery.

Like a Volcano

On the way to the shaft that morning, I saw the two wagons. There they were, perched on the topmost point of the pit-heap. Men were unloading them. If you remember, as a boy,

those cone-like fireworks marked "Vesuvius" or "Etna," and the jet of black smoke which shot up out of them when you lit the fuse, you may be able to imagine what those wagons looked like. In the fury of the gale, they belched filth in two thick columns which flattened out and spread and hid the houses and the village street and the washing hanging on the back-yard lines.

The gale lasted a week. Every day of that week the same thing happened. Every day those wagons were there. Every day the people of the village coughed and spluttered, and the miners' wives tried to keep their houses clean or, for all I know, gave up and waited for the plague to end.

As a newcomer, I could not believe what I saw. My first furious reaction was to go from door to door in the village and organize a petition, a demand, that this filth should be stopped—and stopped immediately. Walking through the black fog, holding my breath, I thought of what would happen if the same thing occurred in a well-to-do London suburb. Within twenty-four hours there would be court proceedings, and within another twenty-four the residents would have an injunction against those responsible for a public nuisance. But here, in this little Durham community, the plague seemed to be regarded almost as an act of God.

Waiting for the cage at the shaft-head, I asked some of the chaps how often the plague came.

"It's happened as lang as I can remember," said one. "We've tried

ter have it stopped: our council tried, but got no farther. Miind you, things have improved. You know all t' old pit-heaps down t' bank? Well, they were arl burning afore t' war and t' smoke turned arl t' brass door-knobs green. We got t' company ter put t' fires oot."

Only a few days before, I had been reading the Reid Report on the technical reorganization of the industry. I have been unable to find out whether the pit-heap fires were actually put out as the result of the village's protest or not. But paragraph 604 of the report suggests a different explanation: "The spontaneous combustion of the carbonaceous material often dumped on pit-heaps causes serious pollution of the atmosphere, and the existence of burning heaps, until defence requirements ultimately compelled the adoption of rigorous measures to extinguish them, were a reproach to the industry."

Defence Requirements

That was the point: "until defence requirements ultimately compelled the adoption of rigorous measures . . ." Perhaps, once again, as in the long history of British coalmining, the rights of people, of citizens, counted for little. But "defence requirements" did the trick.

Ever since that week of plague, especially when it recurred (as it often did), I have been worried about it. "You see," said my marrow one morning, "most of t' people here live

in colliery hoooses. It didn't pay them to complain. Arter arl, a hooose near a pit-heap is better 'n na hooose at arl. In any case, we often didn't knar hoo ter gang about it. There wasn't much education here, ye knar. We've got used t' it."

In spite of the new security and better wages in the village, therefore, the past is still too much with us. We are still suffering from that terrible state of mind, which, until recently, suggested that "For the miner, anything will do." Almost unconsciously, after many fruitless protests, the miners themselves seem to have accepted things as they are. I hope they will not object when I suggest that, hitherto, they have been kept in prison: they have lived in a closed community, cut off from the rest of the country and the full, rich stream of living, and, consequently, have had few standards of comparison. Dirt, above ground and below, has become almost part of their lives. . . .

A stranger to a Durham mining village probably sees things a little too dramatically. Perhaps, you will say, a journalist's craft is to exaggerate. I have not mentioned, for instance, the scrupulous cleanliness of most of the miners' houses, the many neat gardens now bright with flowers, or the efficient-looking Welfare hospital in the district. To-day, however, I must plead that I can see very little of those things, for the black fog from the pit-heap wagons has descended on us again. The plague has returned.

An Inspector's Point of View

Extracts from a Paper "The Abatement of Nuisances from Smoke, and from Colliery Spoilbanks," by W. W. Wilkinson, M.S.I.A., read at a meeting of the Barnsley and District Branch of the Sanitary Inspectors' Association, 20th March, 1947.

THE Public Health (Coal Mine Refuse) Act, 1939, provides that "For the purposes of section 92 of the Public Health Act, 1936, an accumulation or deposit of refuse from a coal mine in respect of which there is reasonable cause to believe that spontaneous combustion is likely to occur shall be deemed to be an accumulation or deposit which is prejudicial to

health or a nuisance."

Proceedings under Part III of the Public Health Act in respect of any such accumulation or deposit of refuse cannot be instituted except with the consent of the Minister of Health.

Previous to the passing of this Act of 1939, any action with respect to a burning spoilbank had to be taken under the nuisance provisions of the

Public Health Act relating to any accumulation or deposit being a nuisance or injurious to health, and the fact that the spoilbank was a nuisance or injurious to health had to be proved.

Little opportunity to apply the provisions of the 1939 Act was possible during the war years. Smoke was encouraged rather than discouraged, but the necessity for preventing fires which might encourage the attention of enemy aircraft compelled colliery companies to take some action in this matter. The steps taken in the instances which I have observed consisted of laying water pipes on to the spoilbank surface, the pipes being moved from time to time and water directed where required to extinguish any blaze. This has not resulted in extinguishing the fires, but has, after a time, reduced the nuisance from smoke and fumes. As the need for preventing glare has vanished with the end of the war, and the public health aspect is apparently relatively unimportant, to colliery managements at any rate, precautions are now neglected, and the spoilbanks revert to their pre-war state.

To comply with the requirements of the Coal Mine Refuse Act, 1939, it appears to be necessary for refuse from the mines to be tipped in such a way that spontaneous combustion is not likely to occur. The principles for guidance in this matter would appear to be similar to those which govern the tipping of house refuse, although, of course, there may be some difference in details because of the varying nature of the refuse.

In one colliery in south Yorkshire I understand that all refuse is retained below ground in the colliery workings (gobbed) and no coal mine refuse is brought to the surface. From the public health and amenities points of view this is the best solution to the nuisance, and if it is practicable at one colliery, the National Coal Board, having the interests of the mining communities at heart, may find it possible to adopt this system at most, if not at all, collieries. This should be tried out, particularly where the colliery has little land for tipping purposes, and therefore resorts to a conical spoilbank. These conical spoilbanks appear to be the worst offenders from fires and fumes.

Failing the possibility of retaining

coal-mine refuse below ground, the refuse will need to be tipped in layers of a depth, I would suggest, not exceeding 10 feet. Large conical tips cannot, in my opinion, comply with the requirements of the Act, and it will be necessary for these to be discontinued. My experience of preventing and extinguishing fires in tips of house refuse suggest the following precautions for colliery spoilbanks :—

Refuse to be tipped in layers not exceeding 10 feet deep.

Refuse to be consolidated as tipping proceeds either by lorries, dumpers or rollers passing over the surface.

Where great quantities of large lumps of coal waste are to be tipped, these should be crushed.

The finished banks and sides of the tip should be sloped gradually and consolidated and covered with a layer of suitable incombustible material like earth or sand.

Coal pickers at the tips should be controlled, as during the cold weather these people light fires on the tip for warmth and this may easily lead to fire in the tip. It would be better to abolish coal picking in the interests of both smoke abatement and local authority refuse collection services.

The best practicable steps which can be taken to deal with existing burning spoilbanks are, in my opinion, those which aim at cutting off the air supply to the materials. Covering with earth or sand, or where the tip has been burning for years the burnt material which takes the form of a red ash, mixed with sand or earth, could be used. The surface should be consolidated to exclude air. This work would, no doubt, be expensive, would need some expert and conscientious supervision to ensure success, but it should be undertaken in the interest of the public living in mining areas.

Some of this coal waste has a fuel value and it is a pity that in years gone by this could not be economically utilized and thus have avoided the necessity for spoilbanks. Experiments are, I believe, being carried out in this direction and may help to solve the difficulty with regard to future tipping.

(In our next issue we hope to include the part of Mr. Wilkinson's paper that discusses the problem of domestic smoke in the coal mining areas.)

Water in the Fuel Ration

To the Editor

Smokeless Air

Here is my little tale. One wet, thawing day in the Spring my ration of 5cwt. of smokeless fuel arrived. I could see at once that the bags were only half-full. One cwt. should fill a 2 cwt. coal bag comfortably, but the weather had been soaking and the fuel is spongy stuff, and this was simply sodden with water. I pointed out its sodden condition and refused to accept it. The coal men were very independent; they said that the fuel had been weighed correctly, and that if I did not like it someone else would. The worm turned and I sent them away and went to see the manager of the local branch of the concern with which I am registered. Not much satisfaction from him. The fuel had been correctly weighed, and if I did not like it I could lump it, but if I wished I could of course write to the Head Office.

I felt that the worm was turning into a hedgehog, and what would be the good of a letter, so I went off to St. Albans and ran the Secretary to earth. I managed to make him understand at last, that I was not willing to pay 5s. 9d. per cwt. for water, and he promised to tell the men to bring me my ration after we had had some dry weather. A few weeks later the fuel arrived, after a cloud-burst had happened the day before. The sacks were slightly more full than before, but they were still not much more than half-full, and I again protested. The men said they could not go against the weigh-ticket, and so I accepted the 5 cwt. of fuel-cum-water, and there it was, a sodden little heap quite unfit to burn.

I decided to make a test, so carefully weighed a 5 lb. sample, which I put in the oven. Considerable steam arose, and when weighed again the sample was only 3 lbs. 11 ozs.—a reduction of 25 per cent. Next I put the dried fuel into a bucket of water, and when weighed again, after several weeks, it had gone up to 5 lbs. 6 ozs., an addition of 45 per cent. The stuff was still floating,

and how much more it might have soaked up I do not know.

With these facts in hand I thought it might be useful to find out under what conditions the fuel was sent out after being manufactured. One coal merchant told me that he noticed that the wooden trucks in which it arrived were sometimes seared by fire, showing that occasionally it is put in in a hot condition, which also means that it is perfectly dry when weighed. It began to look to me as if the merchants would do well to pray for rain, and that profits would be literally heaven-sent, as well as considerable. If my little experiment could show an addition of 45 per cent., no wonder the merchant does not want to store his smokeless fuels under cover, and insists on selling them by weight, regardless of the bulk they show.

Next I went to see the head of the local sub-division of the Fuel Area. Here, I found a quick understanding of all the points I put forward and of the implications of the whole thing. The officer was most keen and helpful, and said he would bring the matter up at the divisional meeting at Cambridge. Later he told me that the matter had been thoroughly discussed and it was agreed that under the present fuel selling regulations there is no redress, unless I liked to bring an action against my dealers for purposely wetting the fuel. This I am not inclined to do, as I do not believe they would be guilty of such a thing, and also because there should be a better way of bringing the state of affairs to the notice of the Ministry of Fuel.

There are several abuses arising out of the present way of measuring smokeless fuels for sale. The first, and most obvious, is that water is an adulteration, whether added by hand or by the heavens, and that it should not be possible for customers to be obliged to pay money for it. The second is that consumers can be deprived of a very large part of their fuel ration, *e.g.*, in my case 25 per

(Concluded on page 23)

SMOKE PREVENTION

ABSTRACTS

Acknowledgments are made, where required, to the Abstract sources indicated.

77. Heat Pumps at Zurich Exceed Expectations (Schweiz, Bauztg, 128, 147; Elect. Industr. Apr. 1947, 47, 147). Although severely criticized at one time, the heat pump installation placed in service in Zurich in 1943 has since supplied practically all the heat used in the central heating of municipal buildings requiring 10,000- to 14,000-million B.Th.U. per annum. Tables of data are given, showing that the predicted performance has been excelled, both in economy in operation and in heating capabilities. An average of about 550 tons of coal per annum is saved, the only coal used during the period 1944-46 being that consumed during a few days when the heat pump equipment was subject to minor derangements. Using river water at temperatures down to about 34 deg. F., the maximum temperature of the water delivered to the heating system is 125 deg. F. A mean indoor temperature of 63½ deg. F. is maintained, the lowest outdoor temperature being about 16 deg. F. For the years 1944-45 and 1945-46 the total energy consumptions of the compressors and pumps were 743,400 and 670,190 kW.h., and the amounts of heat delivered by the heat pumps about 10,000- and 9,600- million B.Th.U. respectively. The capital cost of the heat pump installation can be completely recovered in less than seven years by the saving on operating costs. The pumps are actually designed to cope with all requirements with outdoor temperatures down to 16 deg. F. The results prove heat pump operation to be technically and economically logical.

78. Atmospheric Pollution, Hemeon, W. C. L. and Hatch, T. F. (Industr. Engng. Chem. May, 1947, 39, 568-571). The civic trend is to require more and more from industry in air pollution control. Management generally desires to reduce contamination if it is convinced that there is excessive pollution from their operations, and that it is economically feasible to abate the condition. Industry would be well advised to anticipate the effects of the civic trend by assuming the lead in sponsoring urgently needed

research. Co-operation with public agencies is also advisable to ensure that regulatory actions are based on sound engineering principles. The primary basis for control is the welfare of inhabitants of the community, but gains in this respect will be limited if regulations are impractical. Relations permitting interpretation of community standards of atmospheric pollution in terms of what industry should do must be developed and emphasized. The difficult problems in the control of pollution are economic; the most serious are those problems in which the cost of the only known method is out of proportion to the value of plant operations or to the magnitude of the nuisance. Industrial pollutants are classified according to their outstanding physical properties. A scheme is presented suggestive of procedures for measuring different types of pollution. Control of industrial pollution is effected by tall stacks and by chemical engineering techniques. Stacks approaching 1,000 feet in height may be practical in certain situations. Meteorology, by identifying the most effective "air streams" for the dispersal of contaminants into the atmosphere, can aid materially in the selection of new plant sites that have difficult problems of gaseous waste disposal.

79. Solar Heat Gain through Windows, Billington, N. S. (J. Roy. Inst. Brit. Arch., 29 Jan., 1947, 54, 177-180). After referring to the research programme being undertaken at Purdue Univ., U.S.A., to determine how far it is possible to reduce fuel consumption for domestic space-heating by taking advantage of solar radiation, the author attempts a theoretical analysis of the heating effects of sunshine. The heat loss and the solar gain through 1 sq. ft. of window are computed, and the difference is the net gain or loss of heat due to replacement of 1 sq. ft. of wall by an equal area of glass. The results show that in this country there is not a great difference between the amounts of fuel required for heating rooms with large or small windows, but that small windows are

to be preferred for east and west walls. (B.C.U.R.A.).

80. Flue-Dust Removal Plants, Nuki, R. P. (Pwr. and Works Engng., Apl. 1947, **42**, 116-8). The justification for and advantages of fitting Lancashire and similar boilers and auxiliaries with stationery flue-dust removal equipment are discussed in some detail.

81. Salt Lake City Solves Smoke Problem, Thomas, M. (Power Plant Engng., Mar., 1947, **51** (3), 74-7). An effective anti-smoke programme was found necessary in Salt Lake City. A law was passed to prevent evasion of the issue. All phases of fuel burning are covered. A patrol system was instituted to notify of violators. Combustion equipment and its installation must be approved by city officials. Operators' licences are issued subject to revocation. Ordinance specifies installation conditions of fuel burning equipment. The programme was relaxed during the war. Results of campaign are reported to be gratifying to city commissioners and citizens generally.

Water in the

Fuel Ration—concluded.

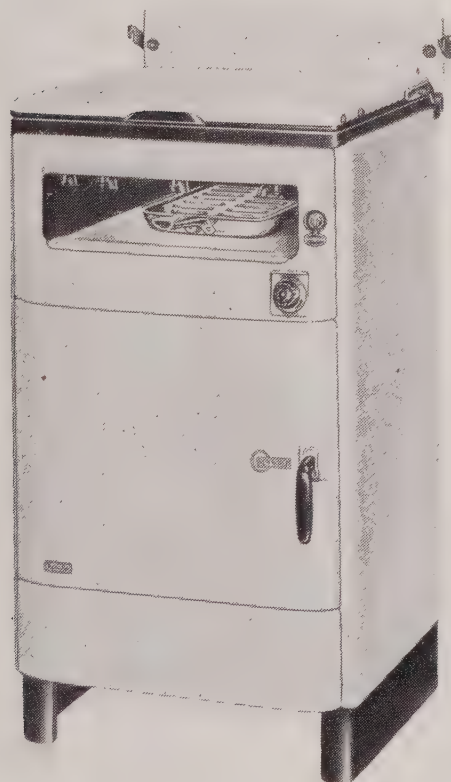
cent., through having to accept this water-adulterated fuel. The third is, what becomes of the surplus fuel left with the coal merchant after his regular customers are supplied with their ration of fuel-cum-water?

As to remedy, I would not dream of advocating that coal merchants be obliged to keep their stocks under cover. What I would like to suggest is that the smokeless fuels, which are made porous and absorbent in the process of manufacture, should be sold by bulk, rather than by weight. If there are any technical difficulties in the way of this, then a standard of measure by bulk should be laid down, upon which the customer may insist if he has any doubt about the fuel being adulterated with water.

Yours faithfully,
Sydney M. Bushell.

Welwyn Garden City.

(We publish this spirited letter because it is important to ventilate grievances that might make it more difficult to popularize smokeless fuels. For the moment we make no comment, but invite the views of other readers.—Ed.)



A New Gas Cooker

We illustrate the latest model of gas cooker, the New World No. 1430. Its appearance speaks for itself, and the simplicity of its design—in smooth contours and rounded-oven interior—makes for ease in cleaning. It is said that its efficiency is such that “four therms do the work of five.” Most interesting is what is called the “air float” oven, in which the inner shell is fabricated in one piece and secured to the front frame by insulated bolts at four points. To the insulation given by the air is added that from a lagging of glass silk covered with aluminium foil.

Messrs. Radiation describe the oven in a fascinating brochure of a new type in which, by coloured section photographs on transparent pages, the oven can be stripped down from either front or back.

“His advice on fuel efficiency brightened our whole production prospects”



“SOMETHING had to be done—we were receiving fuel of unfamiliar grades and in unsatisfactory quantities—so I suggested obtaining independent specialist advice from the Fuel Efficiency Branch of the Ministry of Fuel and Power. I knew of several factories where a visit by the Ministry’s fuel efficiency engineers had taken a lot of the sting out of fuel problems.

“We decided to give it a trial and con-

tacted the Regional Fuel Office. A fuel efficiency engineer visited us and made a thorough study of

our plant. His report set out broad recommendations on boiler house operation, the use of waste-heat, insulation and certain other items. Our own engineers agreed with the recommendations, so we had plans drawn up and went right ahead on them. The result has been an immediate brightening of our whole production picture.”

36,000 firms have taken advantage of this free service and all have benefited—many have achieved major fuel savings and production improvements. Ideas developed in one industry have been applied in others through the uniquely varied experience of the visiting engineers. Brewers, for instance, have learned from launderers and vice versa. The fuel efficiency engineer’s sole concern is the more productive generation and use of heat and power. “Output has doubled: fuel consumption is actually 10% less” is by no means an unusual report on what has been accomplished.

Why not get into touch with your Regional Fuel Office and arrange to have your plant surveyed?

HERE ARE OTHER SERVICES

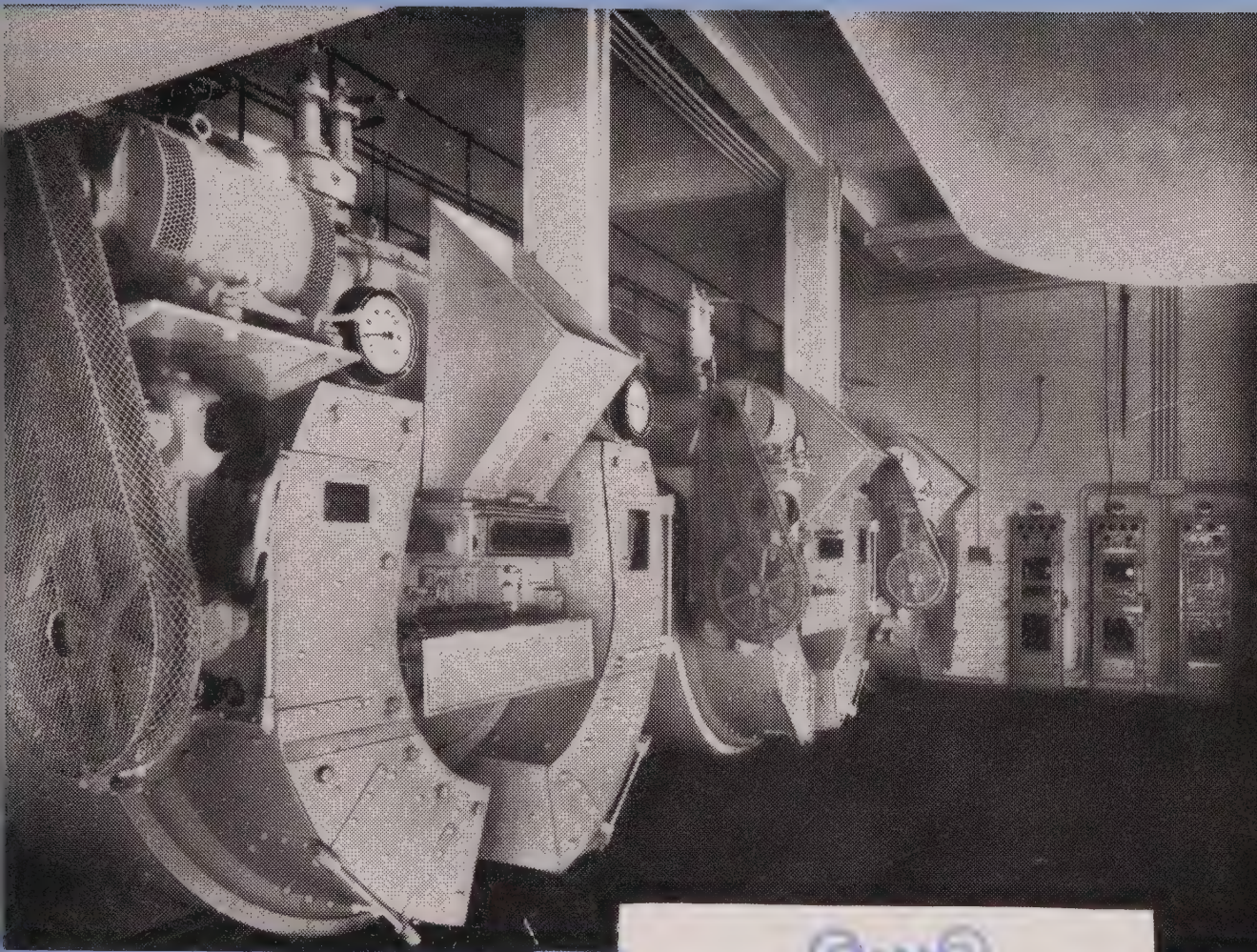
AT YOUR DISPOSAL

- 1 *Training of boiler-house personnel at your factory.*
- 2 *Instructional classes for boiler-house personnel.*
- 3 *Evening classes, lectures and films for executives, boiler attendants and maintenance staff.*
- 4 *Advice and help in setting up joint fuel efficiency committees for works.*
- 5 *Publications (e.g. “Fuel Efficiency News,” special bulletins, leaflets, posters, etc.).*
- 6 *Fuel efficiency films, slides and film strips.*

YOUR REGIONAL FUEL OFFICE

REGION	ADDRESS	TELEPHONE
Northern	Government Buildings, Ponteland Road, Newcastle-on-Tyne, 5.	Newcastle 28131
North-Eastern	71, Albion Street, Leeds, 1.	Leeds 23616
North-Midland	Castle Gate House, Castle Gate, Nottingham.	Nottingham 46216
Eastern	Shaftesbury Road, Brooklands Avenue, Cambridge.	Cambridge 56268
London	Mill House, 87/89, Shaftesbury Avenue, W.1.	Gerrard 9700
South-Eastern	Oakfield Court, Grove Hill Road, Tunbridge Wells.	Chatham 3238
Southern	Whiteknights, Earley, Reading.	Reading 61491
Wales	27, Newport Road, Cardiff.	Cardiff 9234
South-Western	12/14, Apsley Road, Clifton, Bristol, 8.	Bristol 38223
Midland	Temporary Office Buildings, Hagley Road West, Birmingham, 17.	Bearwood 3071
North-Western	Burton Road, West Didsbury, Manchester, 20.	Didsbury 5180-4
Scotland	145, St. Vincent Street, Glasgow, C.2.	Glasgow City 7636

ISSUED BY THE MINISTRY OF FUEL AND POWER



(With acknowledgments to : Messrs. E. G. Phillips Son & Norfolk, Nottingham—Consulting Engineers Messrs. Danks of Netherton, Ltd.—Boiler Makers).

FOR smokeless combustion when burning high volatile or “smoky” fuels specify boiler firing by “Hodgkinson” Smokeless and Gritless Coking Stokers with Self-Cleaning Grates. Used extensively by industrial undertakings, hospitals, institutions, large blocks of flats, civic centres, etc.

Tall, expensive and unsightly chimneys unnecessary, a short stack and induced draught worked in conjunction with Mechanical Coking Stokers, will ensure a continuous “clean” chimney combined with a fuel saving of at least 10% over hand-firing.

Technical advice gladly given upon request.

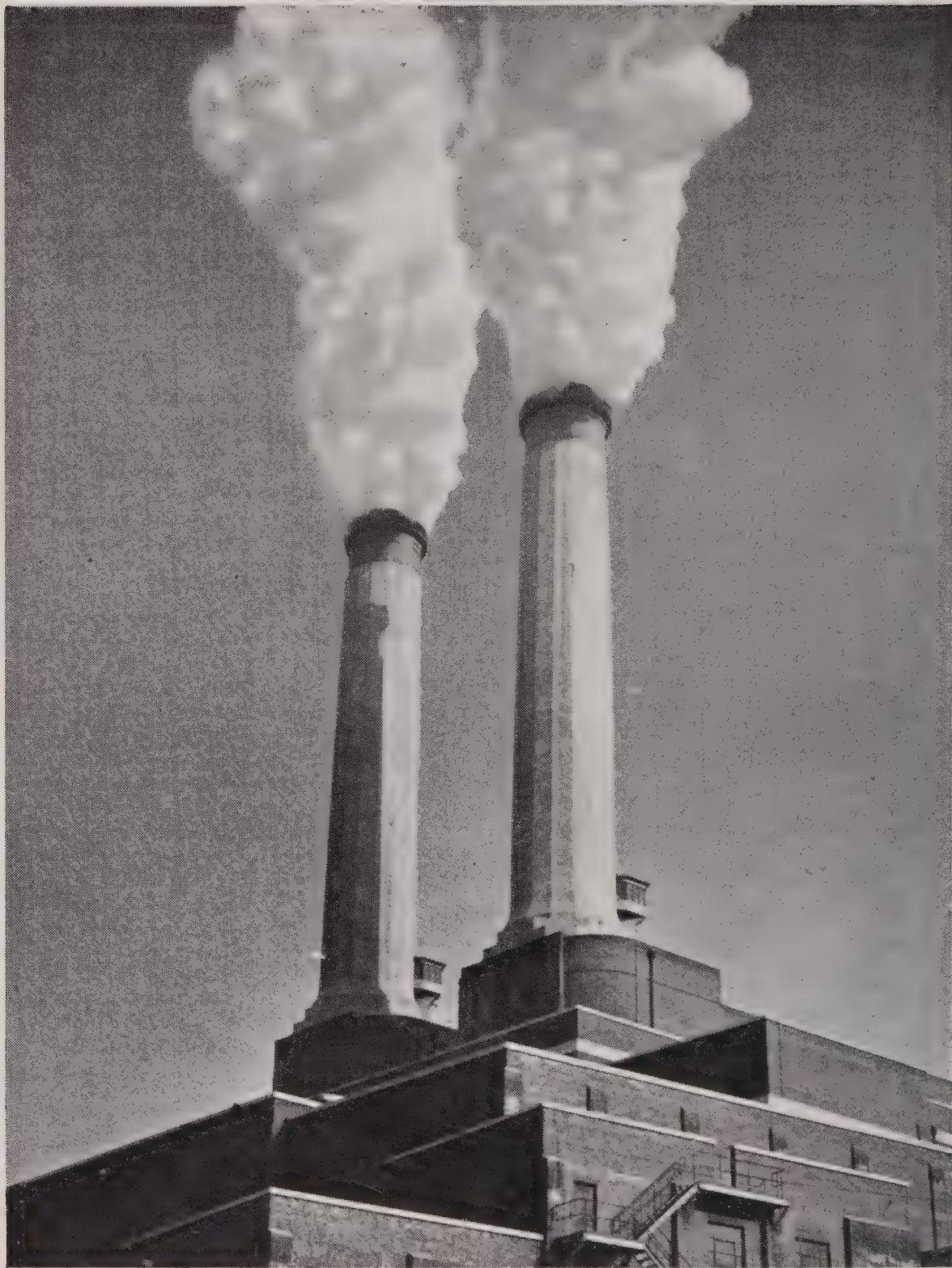
JAMES HODGKINSON

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AN INSTALLATION OF
HODGKINSON
Smokeless
Mechanical
Stokers

AT A MODERN MIDLANDS
GUILDHALL



The fuel burned in 1938 in the power station below these chimneys familiar to all Londoners, contained only 0.875% of sulphur. Despite this, in that year, the last for which official figures are available, the amount of fuel burned released 3,600 tons of sulphur—sufficient to produce over 7,000 tons of sulphuric acid.

Thanks to the flue gas washing plant installed by Howden 97.7% of this sulphur and the accompanying grit, soot and dust were removed from the gases. The discharge to the atmosphere was innocuous and only a white plume of water vapour was visible.

Plants like this will be an important factor in ensuring smokeless air over Britain.

JAMES HOWDEN & CO., LTD., 195 SCOTLAND STREET, GLASGOW

HOWDEN

SMOKELESS AIR

THE SMOKE ABATEMENT JOURNAL



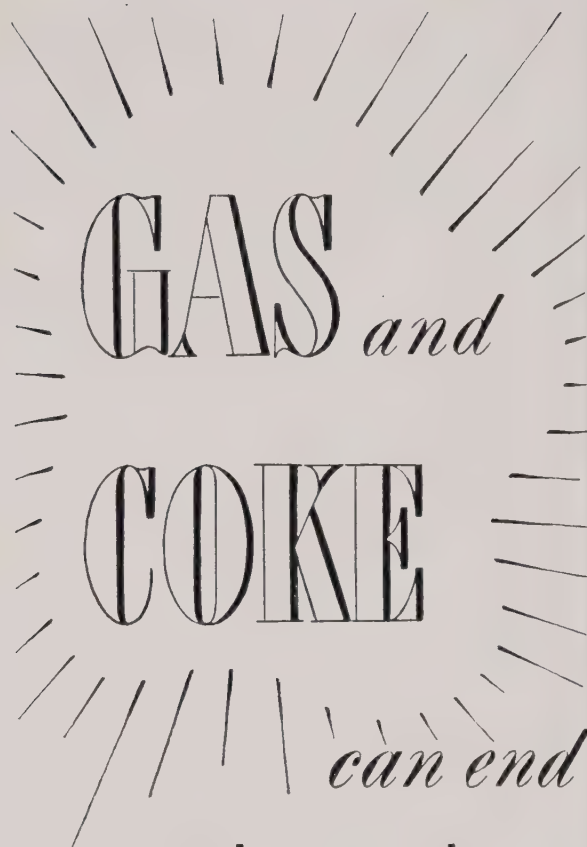
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ONE SHILLING

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SMOKE

**and meet the recommendations
of the "Simon Report"**

The "Simon Report" (The Report of the Fuel and Power Advisory Council on Domestic Fuel Policy) states four main objectives :—

1. *Good standards of heating in the home.*
2. *Low cost and more convenience for the householder.*
3. *National fuel economy.*
4. *Smoke abatement.*

The Gas Industry can satisfy all four requirements with its two fuels, gas and coke. Gas and coke are efficient, convenient to use, clean-working, labour-saving and economical. Both are smokeless fuels; both are products of coal carbonisation at the gasworks, which is the most economical way of using the Nation's coal resources.

The use of gas and coke in the next 4 million homes built in this country would mean a saving of at least 7,000,000 tons of coal annually, compared with other fuels.

COKE

achieves the objectives of the

“DOMESTIC FUEL POLICY” REPORT

The Domestic Fuel Policy Report, popularly known as the Simon Report, contained the following recommendations:

“We have taken the following as our main objectives in framing a national domestic fuel policy to ensure good standards of heating in the house.

Warming the house. All the rooms should be capable of being kept continuously at a temperature of not less than 45-50° F. We call this ‘background heating’...

Hot water. Hot water should be laid on to the bath, basin and kitchen sink. Heating appliances should be capable of giving 250 gallons of water a week at 140° F.

Cooking. Efficient cooking facilities should be provided.

Fuels. We recommend that the Government should encourage the largest practicable increase in the production of smokeless solid fuels suitable for domestic purposes.”

(From the Report of the Fuel and Power Advisory Council of the Ministry of Fuel and Power.)

A complete range of new appliances to burn coke and other solid smokeless fuels is available to meet these recommendations. These appliances will give a better and more economical heat service than any comparable appliances now commonly used.

WARMING THE HOUSE

A convector coke open fire or heating stove will provide background heating for more than one room and greater warmth in the room where it is installed with a higher efficiency and economy than any other type of space-heating appliance.

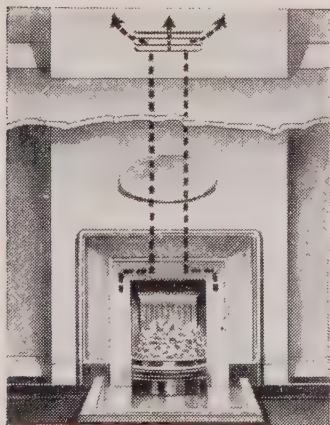
HOT WATER SUPPLY

A modern domestic coke boiler will supply hot water for all domestic purposes at a lower cost for fuel than any other source of hot water supply. Special features are overnight-burning, easy ash-removal, better damper control.

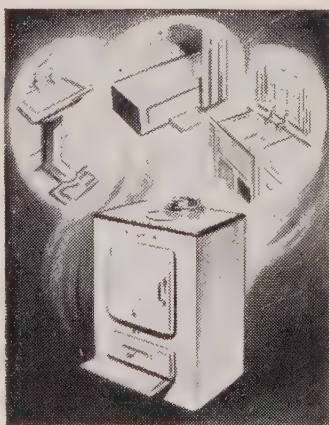
MULTIPLE-DUTY UNITS

Cookers for use with coke have been developed which provide, in addition to highly efficient cooking facilities, hot water supply from a built-in boiler, and in the case of combination and back-to-back grates, space-heating by means of an open fire or heating stove.

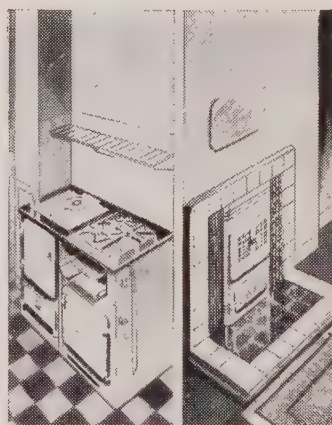
Warming the House



Hot Water Supply



Multiple-Duty Units



SMOKELESS AIR—THANKS TO SMOKELESS COAL



—IT'S "COALITE" IN EVERY TYPE OF GRATE . .

MORE EFFICIENT . . . MORE ECONOMICAL . . .

"COALITE" is the perfect domestic fuel for the modern home. It is suitable for every type of grate. It burns brilliantly and evenly. It is ideal for open and closed stoves, modern cookers and domestic boilers. And, of course, "Coalite" is smokeless. By burning "Coalite" you keep your rooms warm and bright and free of soot.

"Coalite" is half the weight of coal and therefore provides twice as many fires to the hundredweight.

LOW TEMPERATURE CARBONISATION LTD., 82 Victoria St., London, S.W.1

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National Smoke Abatement Society

Chandos House, Buckingham Gate,
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F.R.San.I., F.S.I.A.

General Secretary and Editor :

Arnold Marsh, M.Sc.Tech., M.Inst.F.

OFFICIAL NOTICES TO MEMBERS

Committee Chairmen

The following have been elected Chairmen of the Committees of the Executive Council for the year 1947-48.

General Purposes and Finance : Charles Gandy ; *Publicity :* F. J. Redstone ; *Technical :* Dr. R. Lessing.

New Publications

The Proceedings of the Edinburgh Conference, 1947, is now ready, price 4s. 6d. or gratis on request to full members and their representatives. Separate reprints of the following Edinburgh papers have also been published : *The Composition of Smoke*, by T. F. Hurley (1s. 3d.) ; *The Measurement of Atmospheric Pollution*, by Dr. A. R. Meetham (9d.) ; and *Atmospheric Pollution in Great Britain*, by Dr. C. E. P. Brooks (1s.).

The *N.S.A.S. Report for 1948* (including the annual report and accounts for the year ended 30th June, 1947) has now been published and copies sent to all members. Other readers may obtain copies at 3d. each, post free.

The new edition of *Steer's Law of Smoke Nuisances*, with sections on recent legislation and other additions, is now printing. Copies may be ordered at 3s. paper covers, or 5s. cloth bound.

The Divisions

As recorded in the new Annual Report, Divisional Councils are successfully established in Scotland, the North West, and Yorkshire. It is desired to set up similar Councils in the other Divisions, but this depends largely on the wishes and active co-operation of the members in those Divisions. Although the full support of the Executive Council and headquarters staff will be given, such Councils can only be sustained by local effort and organization. Members who are willing to co-operate actively in the formation of further Divisional Councils are invited to inform the General Secretary. The areas concerned are : North East, East Midlands, West Midlands, South West, and South East.

Book the Date

N. S. A. S.
Conference
1948

—
CHELTENHAM

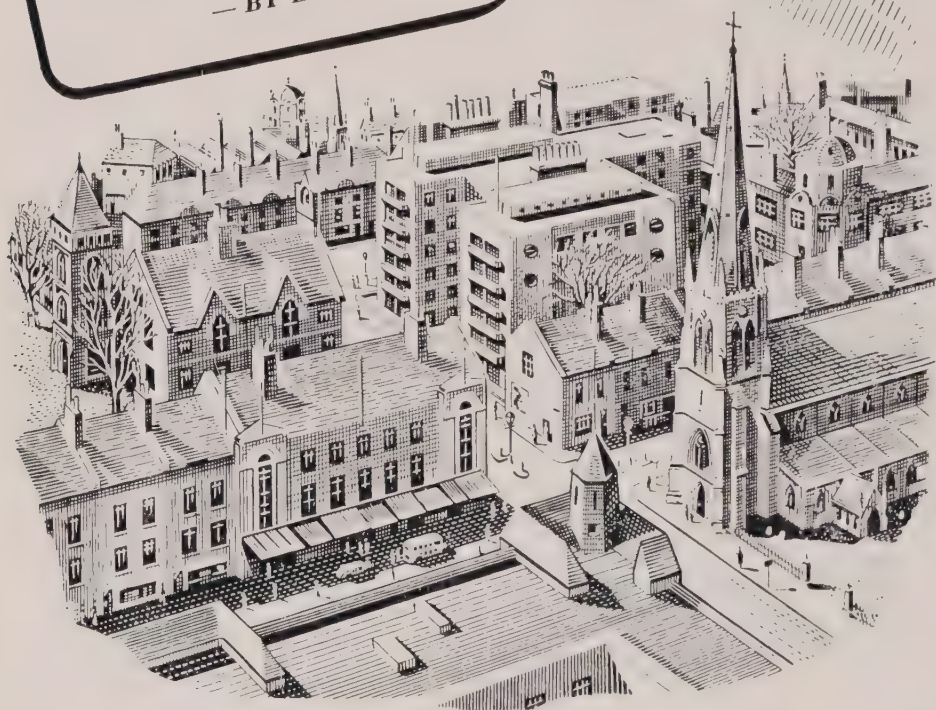
29th September
to 1st October

SMOKELESS AIR. Vol. XVIII, No. 66, Spring, 1948. Published quarterly by the Society at the above address (editorial and advertising).

Gratis to members and representatives of members. Subscription rate : 2s. 6d. per annum, post free.

Smokeless Air is the official organ of the Society, but the views expressed in contributed articles are not necessarily endorsed by the Society. Abstraction and quotation of matter are permitted, except where stated, provided the usual acknowledgments, including the name and address of the Society, are made.

SMOKING
STRICTLY FORBIDDEN
— BY ELECTRICITY



WHEREVER Electricity is used — and that is almost everywhere — there is no combustion of any kind — and therefore no soot, no fumes, no dirt and no destructive acids in the atmosphere.

The modern power station, fitted with special flue-washing apparatus, absorbs up to 98% of the soot and harmful gases produced by its boiler furnaces — an important contribution towards achieving the healthy atmospheric conditions so much desired over all our industrial areas. Electricity is the *completely* clean fuel—clean to use and cleanly produced.

For information and advice about the many new uses of Electricity in domestic and industrial premises, consult your local Electricity Supply Undertaking.

ELECTRICITY

for a cleaner life

Issued by the British Electrical Development Association, 2 Savoy Hill, London, W.C.2.



*Ships, towers, domes, theatres and temples lie
Open unto the fields, and to the sky;
All bright and glittering in the smokeless air.*

SMOKELESS AIR

Smokeless Zone Referendum

THE people of this country are rarely called on to vote for specific proposals, even in local government matters. Public opinion may be mobilized to influence their representatives for or against a proposal, but except for Gallup Polls and so on there are few cases of numerical statements of opinion. An interesting and, to us, significant exception to this has been provided by the city of Coventry which has given us for the first time knowledge of the public reaction to the idea of smokeless zones. A section to give powers to set up a smokeless zone in the central area of the city was included in a Parliamentary Bill now being promoted. Strong opposition was met with in respect to certain other sections, with the result that at a Town's

meeting the sheep were rejected *en bloc* with the goats. A referendum of the electors was therefore held, in which a vote was to be cast for or against each of the proposals separately. For the smokeless zone the poll was as follows :

For a smokeless zone	...	27,990
Against	11,302

Majority For	...	16,668
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This is highly satisfactory, for there had been little or no opportunity for explaining in any detail to the citizens of Coventry what a smokeless zone really means, what it will do, or what it should lead to. We may surmise that those who voted "for" did so because the idea, or principle, appealed to them, and we may also hazard a guess that those who voted against did so on some anti-regulation theory rather than on

pro-smoke grounds. To these we can only say that while freedom from still more regulations and laws may have its attractions, freedom from the injurious, expensive and unpleasant consequences of polluted air is a great deal more important.

Another clause in the Coventry Bill is for a district heating scheme in the central area—one of the means for making the smokeless zone a reality. This too was approved by the electorate, the figures being 26,934 for, and 12,555 against the scheme.

That Fallacy Again

Strictly non-party though the Society is we cannot—nor should we—refrain from deploring a recent propaganda publication of one of the principal political parties. It reproduced a photograph of heavy industrial smoke which would have been excellent for a little homily on industrial backwardness, the importance of fuel efficiency and the waste that all informed people are fighting to overcome for the sake of coal conservation or lower production costs or a cleaner atmosphere. But no, that was not its purpose. The text beneath the photograph began “Smoking chimneys spell prosperity...”

In short, that hoary early 19th century fallacy of “where there’s muck there’s money.” The muddled thought behind it is at once apparent—smoke shows that a factory is working; a working factory spells prosperity; therefore smoke spells prosperity. By similar syllogisms one can show that a pit disaster spells coal output, or that sunstroke spells fine weather. The reasons for the growth of the idea, in a period of primitive technology and cheap, abundant coal, are easy to see and to forgive—but it is irritating to find it repeated in this year of grace by responsible people, to find the patient labours of this Society and others contradicted by a piece of thoughtless mass-propaganda. A number of members informed us with some indignation of this blunder, and we can assure them that suitable representations have been made, directly and indirectly, to the Party concerned.

More Production—of What?

This Conservative Party solecism, since the above paragraph was written, has found a worthy companion in the new Government poster that, by means of a great red chimney pouring out the foulest of black smoke, demands more and more production. Whether this is a call for more smoke or for more inefficiency generally is not clear. It too has brought us indignant complaints, and what we have already said about the pamphlet can be taken as applying to the poster and to those responsible for it. Did they, we wonder, consult the Fuel Research Station, which could have supplied them with some pertinent figures about the consequences of smoke to the production drive, before they went ahead with such a decorative bloomer?

We know, of course, how easy it is to use a smoking chimney as a symbol of industrial activity that will be understood by all. But the point is that its use is as foolish and improper as it would be to urge “more production” by depicting a forger’s den or any other criminal activity.

This Year’s Conference

As already announced, the 1948 annual conference will be held at Cheltenham. It will open on Wednesday afternoon, 29th September, with the annual general meeting, and the conference proper will be on the two following days, ending on the evening of Friday, 1st October, with an informal dinner. The conference will be rather shorter than at Edinburgh, with a correspondingly smaller number of papers. The programme is now being prepared and it can already be seen that it will be of very varied and practical interest, with one or two features of an entirely new kind. Details will be given in our summer issue, and notices will in due course be sent to all members. The usual official invitation to local authorities will be issued towards the end of April. Registrations can be accepted at any time, and as before the conference fee will be a guinea and a half. Early hotel booking at Cheltenham is advised—hotel list sent on request.

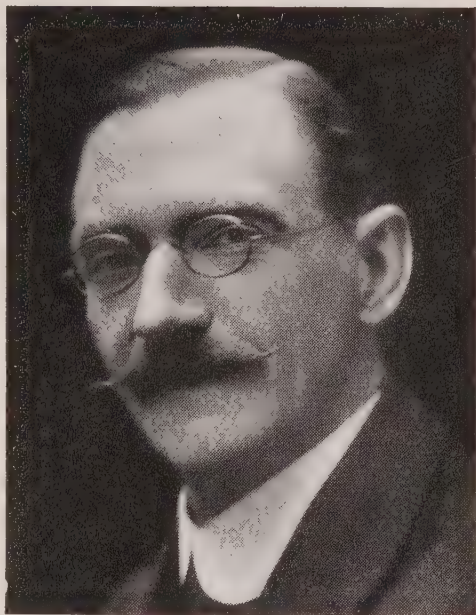
SIR LAWRENCE CHUBB

THE death, on 18th February, 1948, of Sir Lawrence Wensley Chubb, has meant the loss of one of the best friends the smoke abatement movement has ever had. Sir Lawrence had been actively connected with the movement from its earliest days, first as secretary of the Coal Smoke Abatement Society from about 1902 until it joined forces with the Smoke Abatement League in 1929 to form the present Society. Sir Lawrence was elected Honorary Advisory Secretary of the new body until, in 1942, he became Honorary Treasurer, a position he had unhappily to relinquish last year on account of ill-health. His last task for the Society and the cause he always had so much at heart, despite his many other responsibilities, was to revise the foreword for the new edition of *Steer's Law of Smoke Nuisances*, now being printed.

The Society owes to Sir Lawrence more than most of its members can possibly know. In the early, difficult days with Dr. Des Voeux he made the Coal Smoke Abatement Society an influential and respected organization, and his wide knowledge of the law and of the problems of administration were invaluable on many occasions, especially during the many discussions and negotiations that led to the passing of the Public Health (Smoke Abatement) Act of 1926.

Sir Lawrence was born in Australia in 1873 and came to England in 1887. He was knighted in 1930 for his many services to the English countryside. In 1905 he married Gertrude Elizabeth, daughter of Mr. William Anthony, of Southwark. There were two children, a son and a daughter, of the marriage.

He was the first secretary of the National Trust and, since 1896, his principal work was as secretary of the Commons, Open Spaces, and Footpaths Preservation Society. In 1928 he be-



came also secretary of the new National Playing Fields Association. His responsibilities were many and the demands on his time excessive, but without fail he was always ready to give help and advice to the Smoke Abatement Society, even in these latter years when problems arising out of the war and its aftermath made his experience and unique specialized knowledge invaluable to Government department and remote Parish Council alike.

Sir Lawrence's work was concerned always with the natural amenities of life, denied by our changing times to many and in danger of still more restriction to all. Behind it could be seen his own deep love of the freedom of the countryside, the lonely path on down or moor, the open air, and air cleansed from smoke and dirt. An unfailing kindness, wisdom, and clarity of thought and expression are perhaps the attributes that come first to mind in thinking of him, but a memoir far longer than this can be would be needed to give a true impression of one who devoted himself so steadfastly and so spiritedly to great ideals.

A National Survey of Atmospheric Pollution

An Important Project

THE "National Survey of the Sources and Incidence of Atmospheric Pollution" discussed and approved at the recent Edinburgh conference is now being carried out by the Society. It is an attempt to discover, as comprehensively and accurately as may be possible, the specific sources of pollution, its incidence and its actual nature. A request for information, to be given by answers to questionnaires, has been sent to every local authority in England, Scotland and Wales, and whether the effort is successful will depend entirely on the extent to which they respond to our request.

The inquiry has been divided into two self-contained parts, each with its own questionnaire form. The first is short and general and can be completed with little trouble: it asks only for a short list of the most serious forms of pollution in the area; whether the situation is better or worse than in 1939; and whether the area is troubled by pollution drifting from other areas. This should outline a picture of the general situation over the whole country.

Part II goes into much more detail. Its main feature is a table, to be completed with the required figures, in which fuel-burning processes are listed vertically. Across the paper are columns for their numbers, the number producing pollution, whether the pollution is due to coal, oil, pulverized fuel, or coke, whether it is light or heavy, and whether it is smoke or grit. The processes listed number 20 and there is space for additional classes. Examples of the processes listed are laundries, railways, dyeworks, potteries, shipping—the list covers all the main categories.

A supplementary table asks for information about other types of pollution—smoke dusts and fumes, etc.—not caused by the principal fuels mentioned in the main table.

We know that in many cases it will not be easy to complete the second part with precision, and the authorities are being asked to send it back even if its information is incomplete or even negative—even a "don't know" will be a useful fact.

Work on the Returns

Exactly how the returns will be analysed cannot be described until a sufficient number have come in to enable us to discern their general pattern and the detail of the factual information given. We can hardly expect the hundred per cent. return that would enable us to treat the inquiry as a census, but we do hope that the percentage of replies, and their distribution according to region or county and type of authority, will suffice to permit reasonable statistical and generalized analyses being made. We may, for instance, be able to show that three-quarters of so-and-so's are producing smoke, but that nine out of ten of such-and-such plants are smokeless.

Again, we may be able to discover the relative nuisance-values of grit as compared with smoke; what are the most frequent forms of complaint in the country as a whole and in any particular part of the country; why, perhaps, a certain process gives no trouble in one area but serious trouble in another; what reforms need to be given highest priority—and so on. It will be seen that the scope of the project is potentially immense and that it may

well help to provide essential information that up to now has been either unknown or merely guessed.

The actual task of breaking down the information and of classifying it in a variety of different ways, and of assessing and checking statistical material extracted may be greater than we antici-

pate, and it may be, too, that some of the material will give cause for further, special, inquiries. Everything depends on how many of the 1,800 local authorities co-operate. We appeal to all readers who have local authority interests to do all they can to help the survey to be successful.

News in Brief...

R.A.F. Spitfires engaged in an aerial survey of Scotland found they could take photographs of large centres such as Glasgow, Edinburgh, and Dundee only on Sundays because of heavy palls of smoke that made photography impossible on weekdays. ★ Correspondence in *The Scotsman* on the need for a smokeless Edinburgh followed the cleaning of that newspaper's own building, which has so transformed its appearance that a leading article on the letters published wittily said that when it is finished it will stand out from its neighbours "like a bride at a funeral." One of the letters was from the secretary of the N.S.A.S., as a result of which several new members have been gained. ★ We have received particulars of an interesting furnace for shell boilers designed by Charles F. Wade of 117 Wychall Road, Northfield, Birmingham, 31. This is a trough-shaped furnace to provide a deep and hot fire with the greatest possible combustion space above it. An air box or duct beneath the centre of the grate contains openings, controlled by sliding shutters, through which air passes to the main firegrate consisting of loose transverse firebars at an angle, with air spaces of nozzle shape. Other side air dampers regulate secondary air delivered at the sides of the fire and enable a quarter of the grate area to be cut off completely when desired. Combustion is claimed to be chiefly by gasification of the fuel, with completion of combustion by the secondary air supply in a state of great

turbulence. Smokeless combustion is claimed even with difficult fuels, with CO₂ up to 14 per cent. and no trace of CO. ★ Another item of trade news of unusual interest relates to the economic utilization of the grit or fly-ash collected by electrostatic precipitators from pulverized fuel plant. This material has chemical similarities to ordinary clay and by suitable treatment and manipulation it is possible to produce building materials from it. It was originally confined to "M.L." building blocks, of which large quantities have been supplied for housing schemes and factory extensions. A later development has been the production of complicated shapes by a casting method, a system being used in the construction of a new coal-handling plant at the Leicester Power Station. To make good use of material that has been prevented from polluting the atmosphere is a satisfactory kind of development that cannot but help to strengthen the case for extending grit-arresting practice. Further particulars and brochure can be obtained from Vitreous Concrete Co. Ltd., Raw Dykes Road, Aylestone Road, Leicester. ★ Upper Calder Joint Planning Committee recently heard that efforts made to interest the Forestry Commission in woodlands in the Halifax area had not been successful. The Commission was not interested in amenities but only in the production of timber, and considered it unlikely that afforestation could be carried out in the area because of smoke pollution.

The Regional Committees Confer

A new kind of smoke abatement conference took place at Wolverhampton on 21st January, when representatives from each of the seven active Regional Committees of local authorities met to discuss smoke abatement matters of mutual interest. There were morning and afternoon sessions.

Short papers or memoranda were presented by representatives from most of the Committees, the subjects being "The Control of Smoke in the Future" (F. J. Redstone); "Problems of the Administration of Smoke Abatement Legislation" (Dr. Metcalfe Brown); "Uniform Action in Relation to Smoke Nuisances" (C. Ratcliff); "Domestic Smoke" (C. M. Opie); "Education in Smoke Abatement" (Dr. W. R. Martine); and finally by J. W. Beaumont, "Regional Smoke Abatement Committees and future Co-operation with the National Smoke Abatement Society."

With reference to the last, members of the Society will be reassured to learn that there was complete agreement among those present that co-operation with the Society should continue and be developed, and that there was no competition between them but ample room for both. It was not agreed that the domestic smoke problem should be ignored by the Regional Committees and left entirely to the Society—and there is little doubt that the Society would endorse this view.

The discussions were to the point, constructive and informed, and the conference can claim to have had a marked success. It was no doubt helped by the fact that all present had given much thought to the subject and that the small size of the gathering helped to promote that intimate round-the-table atmosphere that is lost in larger meetings. Mr. John Hay, M.B.E., of the Manchester Public Health Department acted as Hon. Conference Secretary and inquiries should be made

to him about the full typescript report of the proceedings that has been prepared and issued.

The North West Division

We congratulate the North West Division on its recent energetic activities, which include the publication of a duplicated News Bulletin sent free of charge to all members and representatives in the Division. The Bulletin records past, and notes future, events, and contains items of news interest that, if space permitted, we would purloin for these pages. Bulletin No. 2, for instance, gives an account of the progress being made at Widnes by the new joint Consultative Committee of members of the local authority, industry, builders, women's organizations, electricity and gas, with the Alkali Inspector for the area and the Regional Fuel Engineer of the Ministry of Fuel and Power as advisory members. Practical work, resulting from discussion, is being done, and already it is reported that there is a considerable reduction in black smoke with further improvements anticipated.

Two important joint meetings have been held during the winter—the first, in Manchester, with the Institute of Housing, at which a comprehensive paper on "Smoke Abatement in Relation to Housing" was read by W. B. Kennedy. The other, also in Manchester, was with the North West Section of the Institute of Fuel, the subject being "District Heating." A paper by E. S. Hancock led to a considerable discussion and questioning from an audience of over 300.

Meetings of the Council have been held at Salford, when the business was followed by a talk by F. Taylor of Salford on "Smokeless Domestic Space Heaters." A later meeting was held at Horwich, Lancs., again followed by an excellent short paper. This was by C. Coop, Chief Sanitary Inspector of Horwich, on the local situation and prospects.

In Parliament

ON 13th November, Mr. De la Bère asked the Minister of Fuel and Power what steps the Government proposed to take to reduce the waste due to loss of heat in smoking chimneys, which has been calculated to be equal to about 10 million tons of coal each year. "Various steps have already been taken to deal with this problem," said Mr. Gaitskell. "The fuel engineers of my Ministry continuously visit industrial undertakings to advise on efficient boiler house practice in order to reduce heat losses caused by incomplete combustion of fuel. Practical demonstrations are given at works; courses of instruction for boiler firemen have been set up and active encouragement is given to the development of more efficient fuel burning equipment. As regards domestic consumption, assistance is given to local authorities in the selection of improved appliances, designed to increase the efficiency with which fuel is consumed. Plans for district heating schemes are also being developed. Further progress must largely depend on the expansion of the production of more efficient heating appliances and a greater production and use of smokeless fuel."

Domestic Heating Appliances

On 5th February, Mr. E. H. Keeling asked the Minister of Fuel and Power whether the Interdepartmental Committee on domestic heating had yet recommended that the output of improved solid-fuel-burning appliances made it possible to act on the recommendation of the Fuel and Power Advisory Council that the manufacture and sale of new appliances falling below approved standards should be prohibited as soon as possible; and how soon the prohibition will be issued.

The Minister replied in the negative, saying that the committee had reported that the output of improved solid-fuel-burning appliances was not yet sufficient to justify that step. He agreed with

Mr. Kelling that the recommendation was most desirable and had been accepted, but that they could not take such a drastic step as prohibiting the production of the older appliances until they were satisfied it was practicable.

Sulphur Washing at Power Stations

On 19th February, Mr. Keeling asked the Minister of Fuel and Power whether he would give an assurance that in all new coal-burning power stations the most modern methods would be used to prevent pollution of the air by smoke, grit and sulphur oxides from the chimneys and by dust from the coal unloaded.

The Minister replied "Yes, sir, whenever this is necessary," and in reply to a supplementary question from Mr. Keeling indicated that generally speaking that what are known as the Battersea or Fulham conditions would be imposed in all urban areas from the outset.

Arising out of this reply Mr. Keeling, on 26th February, asked the Minister to name the stations at which "he has not insisted on the most modern methods being used to prevent the pollution of the air by smoke, grit or sulphur oxides and by dust from the coal unloaded." The Minister's reply was "None" as far as smoke, grit and coal dust were concerned, but that the installation of sulphur gas washing plant had not been required by the Electricity Commissioners at any new coal-burning station since the war, although the standard condition was that such plant should be installed if required by the Commissioners at any time. In further replies the Minister agreed that his answer the previous week had gone too far. "I did not," he said, "have the opportunity at that moment of consulting with technical experts, and I find there are a good many differences of opinion on the technical aspects of the question," and that "the experts disagree a good deal about the amount of sulphur emitted, and the best way of dealing with it."

Water in the Fuel Ration

*The Editor,
Smokeless Air.*

Sir,

I was interested to read Miss Bushell's letter in your journal, having suffered from a similar experience. On April 2nd, 1941, I received half a ton of semi-coke, which appeared to be very wet. This was dumped into my coal-cellar, and on April the 6th and 7th, samples were taken from the top of the pile and examined for moisture, the results being 18.0 and 17.7 per cent. respectively. Admittedly, the results do not give a true picture of the average moisture in the half ton of "fuel;" they were certainly *low*, for the upper layers of the pile must have lost some moisture by air-drying; moreover, the finer material (which was sodden with water) tended to concentrate lower in the pile.

When I drew attention of the local Manager of the Coal Company to the high moisture in the fuel, he expressed neither surprise nor interest; furthermore, he averred that he had no idea of what would be a reasonable percentage of moisture in semi-coke. In view of my non-success in obtaining any redress from the local office, I wrote to the head office of the company, and in the end, was awarded one hundred-weight of semi-coke, without charge.

I observe on consulting my records, that the next delivery, made on May 9th, was again unduly wet, the percentage of moisture being 12.4.

Moisture in fuel is objectionable not only because it reduces the quantity of combustible in a consignment, but also because it reduces the efficiency with which that combustible can be employed. But the question of adulteration by moisture is only one aspect of a larger problem, namely that of total foreign matter (moisture and mineral matter).

Miss Bushell's suggestion that smokeless fuels might be sold by volume

rather than by weight provides a possible partial solution to the difficulties of allowing for adulteration of the fuel either by water or by mineral matter. It would not be difficult to calibrate standard containers by weighing into them some convenient quantity of dry, low-ash coke and semicoke (the bulk-density of these two classes of fuel is not the same). An increase in the percentage of impurities, whether in the form of water or mineral matter, would result in a greater weight of fuel being required to fill each container, thus compensating to some extent for reduction in heating value per unit of weight.

Before the sale of fuel by bulk could be introduced, Parliamentary sanction would be necessary, for in the existing state of the law, no provision is made for coal or smokeless fuel to be sold on any basis other than that of weight, a ton of coke being represented by twenty sacks, each containing one hundredweight of coke. Were the volumetric basis to be substituted, while a "ton" of coke would still be represented by twenty sacks, the actual weight per sack might be anything from 112 lb. to 140 or 150 lb., according as the coke were dry and low in ash or wet and charged with much mineral matter.

There is another pestilent constituent of many deliveries of smokeless fuels which, although not an "impurity" in the ordinary sense of the word, is just as useless to the domestic consumer as water or mineral matter, and that is "fines." Fine material (say, that which will pass a quarter-inch square hole) is practically useless in a domestic boiler or in a closed stove; it gets into the interstices between the larger lumps of fuel, prevents access of air, and as a result, extra use of the poker or shaking grate is necessary, and the fines fall through into the ashpit and are thrown

away with the refuse. To a certain extent, the effect of this nuisance would be compensated were smokeless fuel to be sold by bulk, for a sack of coke filled with sized material can be induced to take in a certain proportion of fine and dusty particles without overflowing. The compensation would, however, be less complete than that occurring when moisture or mineral impurity increased.

Although, during living memory, fuel has been sold by weight, sale by bulk would represent a reversion to the practice which obtained early in the 19th Century, for I find that according to a balance sheet for gas production at the Gas Light and Coke Company's Westminster Station in 1819, that coal and coke were measured in "chaldrons and bushels," a chaldron being an old measure for coal, consisting of 36 heaped bushels, equivalent to $25\frac{1}{2}$ hundredweight. The chaldron as defined above would be unsatisfactory as a basis of measurement, because so much would depend on the extent to which each bushel was "heaped." If 36 bushels be accepted as the unit, then, taking the figures for "good commercial fuels" from *Technical Data on Fuel*, per unit of measurement, the following quantities of coke would be delivered:

	Cwt.	Therms
Coke-oven coke	12.3	183
Gas-coke	8.7 to 10.7	128 to 159
Semi-coke	7.84	118

It should be noted that a "good commercial fuel" is defined as one which contains 2 per cent. moisture and which yields 7 per cent. ash. It will be observed that there would be great inherent variations between the weight delivered per unit of 36 bushels, and similar divergence between the thermal deliveries. On the other hand, provided the only variable were the moisture, then the thermal delivery per "unit" would be unchanged. An increase in mineral impurity would not be entirely compensated, although, if it true, the weight of the unit would increase.

The fact is of course, that the whole basis of the sale of solid fuels requires

drastic overhaul. As an interim measure, however, Miss Bushell's proposal is well worth serious consideration. I fear, however, that its very sanity and simplicity will be the factors which will militate most against its adoption.

GODFREY W. HIMUS

London.

The Editor,
Smokeless Air

Sir,

I would like to take the opportunity of supporting every word of the good-natured complaint in your last issue, re "Water in the Fuel Ration."

I think that 25 per cent. is quite a fair estimate of the water content of many deliveries we have had in the last year or two. This is an important matter and will react very unfavourably against the use of smokeless fuel, and also against recommending it to friends.

In its *dry* state I reckon it slightly more expensive than coal, but this is compensated for in cleanliness. In its wet state even the idealist has to think twice. Our last delivery ten days ago is still wet. We place our surplus in the corner of a garage and have noticed the wooden floor quite wet from the drainage of water.

As to the remedy—the individual as seen in your letter has little weight in protesting, but if, as I expect you have a good many correspondents in support, the Society might make representations in the right quarter.

I do not think that bulk buying is the solution. I do not want to buy water, and the only solution is to prevent it entering the fuel. If it leaves the works in open railway trucks some cover ought to be provided—even then the retailer may allow it to become damp in an open heap. So the problem is complex, but unless something is done I am afraid many users will discontinue its use.

ERNEST W. PONTEFRAC.

Manchester, 21

*The Editor,
Smokeless Air.*

Sir,

Your correspondent, Miss Sidney M. Bushell, whose letter appears under the above heading in your last issue of "Smokeless Air" has, as she points out, been the victim of unfortunate circumstances. I am glad to assure her that insofar as coke is concerned, her experience is a rare one which should not be repeated. She will, no doubt, agree that her complaint might have applied equally well in the case of other fuels and in this respect it raised, therefore, a broader issue of the possible desirability of some form of control of the quality of all solid fuels in the future years.

It stands to the credit of the gas industry that the quality of coke is kept under constant review and has thus been improved, to a marked extent, over the period of the last two decades—even during the war years and latterly when consistent supplies of high quality gas coal from which coke is manufactured, have not always been available, every effort has been made to maintain coke quality at the highest standard possible under the circumstances.

The ash content of coke is entirely dependent upon that of the coal from which it is carbonized but the moisture content can, however, be controlled, with certain limitations, in the preparation of the fuel. It is generally recognized that a minimum figure of 3 to 4 per cent. moisture content is the least which is desirable, while a maximum of from 8 to 10 per cent. represents the highest moisture content advisable in a domestic fuel. These moisture contents are the target figures at which the industry as a whole aims. They are self-imposed limits laid down to ensure a high quality product suitable for use by the public.

In these days of fuel shortage, coke does not normally lie in open storage for any considerable period and, therefore, it usually reaches the consumer without any appreciable gain in moisture content. On the other hand,

coke should certainly not be stored in the open during the winter months when it tends to gain moisture causing such annoyance as has been experienced by your contributor and, at the same time, suffering degradation in size and thereby causing a loss of saleable fuel.

Miss Bushell's suggestion that smokeless fuels should be sold by bulk rather than by weight is not a practicable one. Coal is carbonized in a number of different types of retorts and the resultant cokes vary widely in their bulk densities. For instance, in the domestic sizes this may be considerable—70 cu. ft. to 112 cu. ft. per ton dependent upon the method of carbonisation. Merchants do not always draw their coke supplies from a single source and thus any method of sale by bulk introduces obvious possibilities of serious confusion and error.

Taking the long view of the matter, I suggest to your contributor, that the ultimate and ideal method of distribution, would probably take the form of the sale of all smokeless fuels bagged, either at the production plant or at a central depot, where they can be properly handled. Thus, for the future, one might visualize the consumer receiving a guaranteed weight of material of a standard quality, maintained in first class condition by enclosure in a moisture proof bag.

Such an ideal lies in the future. In the meantime, I can assure Miss Bushell that the policy of the gas industry, as a whole, is to continue to strive for the production of coke of the highest quality and thus serve the best interests of the public while furthering the cause of smoke abatement.

J. O. COOKE.

London and Counties Coke Association.

A Salford Corporation Bill has recently been before Parliament, in which clauses relating to the establishment of smokeless zones and prior approval were accepted. Smokeless zone powers are also included in a Rochdale Bill about to come before Parliament.

Home Smoke in the Mining Towns

By W. W. WILKINSON, M.S.I.A.

A further excerpt from the Paper, read at Barnsley, printed in part in our last issue

FIRST I wish to deal with domestic smoke, as it affects the South Yorkshire coalfield district. Coal shortage does not appear to have reduced the smoke nuisance, although possibly, if accurate figures were available for our districts, some reduction in soot fall might be found. In these districts where the majority of workers are engaged in coal-mining and receive supplies of "home coals" which are probably sufficient in quantity to keep 2 fires going all the year round, reduction of smoke nuisance, even in this period of coal shortage, will hardly be apparent. Because of this comparative abundant supply of raw coal in these mining districts, the cure of the domestic smoke problem is likely to lag behind other districts where coal supplies are difficult and more expensive.

The amount of smoke produced will, of course, bear some relation to the quantity of coal burnt. The old-fashioned kitchen range so common in these districts is far from economical in coal consumption, in fact, in the case of large quantities of coal placed on the fire, the most smoke producing content of the coal is burned and the remainder, which would burn comparatively smokelessly under suitable conditions, is either raked out or falls through the bars and is carried away to fill the dustbin. One fire in each of these old-fashioned ranges will, therefore, in many dwelling houses in these districts, probably consume twice as much coal as a modern range or fire grate. Add to this fact that because of shift working at collieries, some members of mining families may be off to work early in the morning whilst others are returning home late at night, and the fires are kept burning for long periods, and in some cases, day and night continuously, the domestic smoke nuisance in these mining districts is relatively greater than in non-mining districts.

To begin with, therefore, domestic smoke abatement in mining areas starts

with a heavy handicap, and there is greater necessity here than in non-mining districts for more effort to be made to remedy the evil.

This question of "home coals" should be tackled, and all the various aspects placed before the miner and information given on improved, less expensive and labour-saving heating and cooking facilities for dwelling houses. I cannot imagine that in any other trade or business would employees be willing to purchase the worst of the goods his employer sells. The butcher's assistant would want to take home as good a joint as any he supplies to his customers, and in other trades likewise. The miner, at some collieries to my knowledge, has always been supplied with the poorest quality of coal, the best quality house coal he produces being sent away to burn in other people's fire grates.

I think the miner has probably never fully considered the many disadvantages relating to the use of inferior coal in the old-fashioned kitchen range as occurs in so many houses, and I should like to enumerate some of them. Owing to the inefficient use of the coal for reasons previously mentioned, and because of the amount of dirt, shale and dross in the coal, the amount consumed may be anything like 10 or 12 tons per year instead of say 4 or 5 tons. Therefore, in respect of cartage of coal from the pit to the house, getting coals in at the house (which usually means more dusty, dirty and hard work, particularly in new housing schemes where there is a long "carry"), daily carrying of coals to feed the fire either up the steps from the coal cellar or from the backyard, the daily removal of the waste ashes from the fire-place to the dustbin, and the removal of ashes from the dustbin to the place of disposal by the local authority, more than twice the amount of labour and expense is incurred than is really necessary if suitable coal was burned in an efficient fire-place. The increased

cost involved in transport and to the rates, and the extra labour and dirt, has mostly to be borne by the mining community.

Fortunately, or perhaps unfortunately, people who spend their lives in these industrial areas become inured to the smoke nuisance and do not realise its existence, except perhaps at intervals when for some reason it is impressed upon them, probably when they return to their own smoky locality after a holiday at a seaside or country holiday resort. On a dull windless winter's day, when the smoke hangs low and the soot falls heavily, when the accumulations of shale and rubbish seem to be more plentiful than usual in the back-

yards and waste spaces, I think even children are sometimes impressed with the dirt and squalor of it all.

Smokeless Periods

Mr. Wilkinson continued by considering the legislation on smoke and suggested that in addition to smokeless zones there might be "smokeless periods"—namely that the use of fuel for domestic purposes during the summer months might be restricted to smokeless fuels. This might break the coal habit, so that the period could be extended in due course to the other months of the year. The last part of the paper discussed the question of colliery spoilbank nuisances.



A 1,600 h.p. Diesel-Electric Locomotive

Some time ago the London, Midland and Scottish Railway, which had taken a leading part in the development in this country of the diesel-electric shunting locomotive, entered into an agreement with the English Electric Co. Ltd. to design and construct a main-line locomotive—diesel-electric propulsion for main-line working has made great strides in recent years in the U.S.A. and elsewhere. We illustrate (by courtesy of *B.E.A.M.A. Journal*) the first of two identical 1,600 h.p. units to be completed. After preliminary trials it is proposed that it shall go into regular fast passenger service between Derby and St. Pancras, and later between Manchester and St. Pancras. When the second unit is completed it is the intention that both should be coupled together on the Euston-Glasgow line.

Some technical information about the locomotives may be of interest. They are of the 0-6-6-0 type, 1,600 h.p. continuous rating, 41,400 lb. maximum, and 15,000 continuous, tractive effort. Length over buffers is 61 feet 2 inches, and estimated weight in working order is 121.5 tons. Engine fuel capacity is 815 gallons main tank and 185 gallons service tank, with a carriage warming boiler fuel tank of 130 gallons. The engine is a 16 cylinder Vee-type four-cycle, turbo-charged unit, having a 12-hour B.S. rating of 1,600 b.h.p. at 750 r.p.m.

The engine is started by motoring the main generator from batteries, and the connections are so arranged that the electrical circuit cannot be completed until pressure has been built up in the engine-lubricating system by means of a motor-driven priming pump. An over-speed trip is fitted, which automatically stops the engine if a pre-determined speed is exceeded.

Reviews

New Publications

COMPRESSION must be the keynote of this issue's rather long list of notices. First in the batch is Dr. G. W. Himus's **Elements of Fuel Technology** (Leonard Hill, 42s.; pp. 506). This is one of the books that a reviewer cannot avoid calling "indispensable." From a consideration of fuels in general it passes to the formation of coal and Britain's resources and requirements, and then to all the main uses of coal as a fuel and as a raw material. Liquid and gaseous fuels are included, together with chapters on fuel economy in furnace practice and on domestic heating. The work is therefore very comprehensive, and although the author calls it "a brief and simple outline of some of the problems involved in the correct use of fuel" it is in no sense sketchy or too generalized.

The smoke abatement worker will find much of direct value in the discussion on efficient combustion, the preparation of smokeless fuels, and the chapter on domestic heating. There is a short section on the smoke nuisance itself, although unfortunately the time that has elapsed since the book was completed (1943) has prevented the inclusion of references to the many developments we have seen since then—for example, the Simon Report on Domestic Fuel Policy, smokeless zone and prior approval legislation, district heating, and so on. We hope that these and other important advances in smoke prevention will be noted in the next edition—which we do not doubt will soon be called for. Dr. Himus devotes some attention to the problem of excessive moisture in smokeless fuels, the first time we have seen this mentioned in a text-book, and it is curious that this should have appeared just as the question was being discussed in this journal. A sequel is the letter that appears on another page.

¶ Also to be regarded as indispensable smoke, or rather atmospheric pollution, literature, is the **83rd Annual Report on Alkali &c. Works** by the Chief Inspectors (H.M.S.O., 9d.; pp. 40), which covers the year 1946. In addition to control of processes registered under the Alkali Act and Orders, the Inspectors pay attention to many unregistered processes—308 such visits were made in the year—and reference is made to the "large number of complaints of smoke and grit" from steam-raising plant. This has been found to be due fundamentally to the supply of fuel differing from that for which the installation was designed. Reasons for heavy smoke are summed up as being usually (1) inadequate plant, (2) unskilled stoking, and (3) unsuitable fuel. Employers are urged to encourage stokers to attend the courses of training now generally available. Particular attention was given during the year to a Power Station in the London area in respect of which sustained complaint of grit emission had been made. Samples of the deposits were found to consist almost entirely of coke particles which came from a boiler system and ash particles characteristic of pulverized fuel.

Burning colliery spoilbanks again receive anxious consideration, and it is pointed out that although the Alkali Inspectors no longer possess statutory powers to deal with them they can and do make recommendations. They cannot, however, undertake the "policing" that is required, and "as a result it has often been found that by the time the Inspector's attention is called to a spoilbank either by a complaint being received or by a request for assistance from a Local Authority, combustion has reached an advanced stage when it is difficult to secure control." The report continues: "Although a satisfactory improvement has been effected

in many areas, the rate of deterioration in others has been greater, and unless more vigorous efforts are made a further worsening of the position is to be anticipated."

The report draws attention to cases of harm done to cattle by fluorine in deposits from brickworks in Bedfordshire, where the clay used is relatively high in fluorides. Although the extent of this danger has not yet been fully investigated the Geological Survey think that the whole outcrop of Oxford Clay from the Dorset coast to Lincolnshire may be involved. Reference is also made to fluorine emission from pottery kilns and a suspected case from ironstone calcination.

¶ For many years to come any alternative fuels to coal will be of importance and should be given the closest scientific examination. As such a contribution comes a Fuel Research Station report, **The Winning, Harvesting and Utilization of Peat** (H.M.S.O., 6d.; pp. 24). Pre-war, 120,000 tons of peat a year were sold in this country, but of this only 2,000 tons were used as fuel. It is now estimated that about 1,000 million tons of air-dried peat, with 25 per cent. moisture content, could be won. Dry peat of normal ash content usually has a gross calorific value of 9,000 to 9,500 B.Th.U. per lb. Details are given of the "Peco" process used in Eire for the preparation of dry briquetted peat of calorific value 8,300 B.Th.U. per lb. It is estimated that by this process in the U.K. the cost of production would be 35/- a ton. Transport costs are greater than for coal, so that on calorific value peat could not be made competitive with coal.

With reference to the briquetted product the report says that lighting was rather difficult and the initial rate of combustion slow. "Large volumes of light grey smoke were produced during the lighting period, but when the peat was burning freely very little smoke was produced. It would be difficult perhaps to regard peat as a smokeless fuel, even though it is probable that the smoke is more akin

to wood smoke than to coal smoke, and less injurious in its consequences than the latter.

¶ Everyone agrees that new houses should be given the more efficient fuel-burning appliances developed during the past few years, but even so there appears to be little general appreciation of the enormous new demand for coal and its derivatives that must be met as the housing programme progresses. Apart from smoke prevention, economy, and greater convenience for the householder, it is necessary that everything possible be done to reduce as far as possible this growing new outlet for coal—coal that it will be more profitable in one form or another, to export.

The new appliances can do much to reduce this potential consumption, and further savings can be affected by the use of warm air convected from the stove or open fire into the room, into a room above, or throughout the house to give "background heat." Methods and principles of design for accomplishing this in small dwelling houses are explained and illustrated in **The Gravity Warm Air System** (H.M.S.O., 1s. 6d.; pp. 12 with separate design sheets), issued by the Ministry of Fuel and Power for the Interdepartmental Committee on Domestic Heating. The term "gravity" is used to distinguish the system from that in which warm air circulation is attained by means of a fan. The house must be planned so that the flue and warm air ducts ascend centrally, and the system is of course made more effective if the questions of insulation and draught exclusion are given full attention.

¶ The 26th volume of **Fuel Efficiency Review**, for 1947 (Federation of British Industries, 2s. 6d.; pp. 64) is as interesting and informative as ever. Its scope can be indicated by reference to some of the principal articles, which deal with the industrial usages of fuel oil, pulverized fuel, and coke, hydro-electric power in India, utilization of inferior grades of fuel, fuels for gas producers, electricity tariffs for industry, power economy, centralized steam,

and the gas industry. It is a pity that this is not a monthly instead of an annual production.

¶ It is unfortunately impossible to compress into a few lines the important arguments and analyses that have gone into the **2nd Report of the District Heating Committee** of the Institution of Gas Engineers (I.G.E. Publication No. 323). An answer of the gas industry to the challenge of district heating, it is shown that gas, or preferably gas and coke together, can give a service equal to district heating with a low total coal consumption. The annual coal requirement in a gas and coke scheme is given as 3.47 tons, for gas alone, 4.26 tons, and for gas supplementing district heating 4.87 tons (4 tons district heating and 0.87 tons for gas cooking, wash-boiler and topping-up). The three charts given in the appendix are significant and the report should be carefully studied by all who are anxious to form a fair judgment between the protagonists of district heating and their critics.

¶ Of a very different nature is a new example of the clever publicity of the gas industry. This time it is for the children, and is a well-produced fairy story, illustrated with colour photographs and in black and white, called **Pictures in the Fire** (British Gas Council, 3s. 6d., pp. 32). Mr. Therm plays the part of the fairy and tells the story of coal, its winning, and its transformation into gas, coke and other riches. The smoke abatement moral is well brought out, and altogether such propaganda is of general national value as well as profitable to the industry itself. Perhaps the best thing we can say about the book is to quote the thoughtful review of the five-year-old who had perused it with care: "It is a nice book. It is a *very* nice book."

¶ Two useful reprints from the *Steam Engineer* come from John D. Troup Ltd. They are **Vertical Boiler Defects and Repairs** (5s. 6d.; pp. 40) and **Boiler Performance Simplified** (2s. 6d.; pp. 12), both by Sidney D. Scorer. The latter especially might

be read with advantage by every smoke inspector.

¶ **f.a.c.t.** is the cryptic title of a new pamphlet of the Fuel Efficiency Committee of the Ministry of Fuel and Power. It stands for "Fuel Automatic Control Technique," which in turn is interpreted as being the science of temperature control by automatic devices that lays the foundation of thermal efficiency and eliminates much waste of fuel in space and process heating. Sample facts about f.a.c.t. show that the coke required for space heating in a warehouse was reduced from 40 to 30 tons a year; that in dye-works in one factory steam requirements were cut from 2,000 to 450 lbs. a day.

¶ More and more attention is being given to the Heat Pump, and it is not fantastic to imagine this as being at present merely in its earliest infancy, but destined to become in the future a major factor in the solving of our space-heating problems. Two papers read in March of last year to the Institution of Mechanical Engineers have been received and should be noted. They are **The Air Cycle Heat Pump** by T. F. Thomas, and **The Norwich Heat Pump** by J. A. Sumner, City Electrical Engineer, Norwich. The first is a theoretical examination of the principles involved in the heat pump, and the second is a full account of the successful pioneer installation at Norwich.

¶ From Liège we have received the **Bulletin** of the Association "pour la défense de l'Ourthe et de ses affluents," a body that we assume is not unlike our own countryside preservation societies. Such associations should be interested in the abatement of the smoke of the towns and industrial areas, which can inflict so much damage over the surrounding countryside, but in this instance it is not demanded that pollution of Liège should be reduced for the sake of the great woods that surround it, but that the woods must be preserved because they enrich the air and remove from it the dust and the poisonous gases of industry.

A Bonus system for Boiler Firemen

**From a Paper presented at the
Pulverized Fuel Conference, 1947**

By G. MacKay

THE saving of coal to-day is the country's most vital concern; even at the point where it is produced the need for economy is as necessary as anywhere else. The object of this paper is to describe a colliery boiler plant where fuel is carefully checked and where a saving has been effected by training the boiler-room staff in efficient firing and rewarding their efforts.

In the boiler-house there are twelve Lancashire boilers, six fired by pulverized fuel and six hand-fired with low-grade fuel. The boilers were constructed in 1917 for a working pressure of 160 lb. per sq. in. and measure 30 ft. x 8 ft. The brickwork setting is similar except that the six pulverized-fuel-fired boilers have explosion doors fitted along the top of the side flues. All boilers are fitted with superheaters, and each set of six boilers has a standard cast-iron tubular economiser of 520 pipes. Five pulverized-fuel boilers are working constantly with one off for cleaning purposes.

The pulverized-fuel plant was installed in 1925, the first in Scotland, and, I think, still the only one.

The success of pulverized fuel depends on the degree of pulverization with the complete mixing of coal and air. And before installing a pulverized fuel plant it is necessary that careful consideration be given to the fuel to be used. Careful analysis is necessary, particular attention being given to the moisture content and percentage of ash.

The Bonus Scheme

The efficiency of the boiler plant cannot be ensured unless the full co-operation of the fireman and boiler-

house staff is obtained.

A bonus scheme was therefore introduced at Newbattle Collieries.

In addition to the 12 boilers mentioned in the paper there is another range of 6 boilers operating at 100 lb. per square inch pressure which supply steam to the winding and haulage engines and which use the same chimney as the other twelve. The firemen on all three sets of boilers are included in the bonus system, i.e., the 12 boiler range (six pulverized and six hand-fired) and the six low-pressure boiler range. These latter boilers were for many years the only boilers at the colliery.

We arranged a meeting at which attendance was voluntary, at which the firemen were asked for their co-operation. Meetings were then held in the evenings in the colliery office once a month. The chief engineer took the chair and his assistant acted as secretary. In the beginning the attendance was rather disappointing, but it gradually grew until after six months all the firemen were attending, and those on duty arranged that half would go to the first half of the meeting and return to let the others attend the second half. After the first few meetings a bonus system was agreed upon, the firemen agreeing to observe the following conditions:

(1) The emission of black smoke from the chimney not to exceed five minutes.

(2) The CO₂ to be kept above 9 per cent.

(3) The working pressure to be maintained at all times.

(4) The carbon in the ash to be kept at the minimum.

(5) The boiler fronts, pumps, fittings, gauges and glasses to be kept clean, with water levels maintained at the proper working level as indicated by the pointer. The boiler house also to be kept clean and tidy.

Specific instructions embodied :

- (1) the importance of steam and water pipe lagging ;
- (2) regular attendance to leakages in boiler brickwork ;
- (3) balanced draught and operation of dampers ;
- (4) general cleanliness and elimination of waste.

The firemen were quick to realize how much these items could affect the bonus, and everyone became a snooper, with resultant advantage. The first item, emission of black smoke, was rather a problem to solve, the two hand-fired systems being always looked upon as the offenders, but by short cessations of firing and closing the dampers of a section at a time, the culprits were soon found and eliminated. It transpired that the pulverizing system was undoubtedly at fault. This led to a thorough investigation. The P.F. plant attendants, who were not in the bonus scheme, had to be brought into it, as overfeeding of fuel to the main supply pipe, coarse grinding and moisture were contributing to the black smoke emission. The teething troubles were quickly overcome by wholehearted co-operation. One other man had to be co-opted into the scheme, this was the man who regulated the fuel to the 6-boiler range. Occasionally three or four wagons of sweepings from the sidings would be sent to this range, which were of a much poorer quality of fuel than that usually supplied. This man was instructed to spread the wagons over the week and not to dump them altogether into the stoke hole. A book was placed in the boiler house in which the firemen on duty could enter anything wrong on his shift and if he had caused black smoke, his reason for doing so. If his reason was considered sufficient the bonus was not deducted.

On Monday mornings it was dis-

covered that the hand-fired boilers were responsible for the persistent emission of black smoke ; this was due to the boilers being damped down at week-ends and the flues becoming cold, but by raising steam two hours earlier this trouble was eliminated. At first sight 9 per cent. CO₂ may seem a low figure, but fairness must be the keynote of any system. The CO₂ recorder tested the main flue gases, that is the combined gases of the pulverized and hand-fired ranges. The six old low-pressure boilers have a separate CO₂ recorder. The cleaning periods obviously showed a drop in CO₂, changes of shifts and light loads also indicated a decrease, and it was to include these particular periods that 9 per cent. was set. The CO₂ reading through 24 hours was usually between 11 and 12 per cent.

Monthly Meetings

At the monthly meetings all complaints are investigated and suggestions examined, and on occasions the bonus has been deducted. The firemen concerned readily admit all faults, there have been no recriminations, but just a whole-hearted co-operation, which has resulted in greatly increased all round efficiency, and a saving of four tons of coal per day with never a hold-up for lack of steam. The blow-off valves are rarely found in action as often was the case before.

To begin with, a bonus of 1s. per day was granted to all firemen who complied with the regulations, and if they had a complete week's run (of six days) without deduction another 6d. per day was granted, making 9s. per week.

In recognition of the wholehearted co-operation, the bonus was increased to 1s. 6d. per day, and with a clear week's run without a deduction another 6d. was added, making a total of 12s. per week.

It was interesting to watch the development of this scheme. Many of the firemen began to attend the technical evening classes and lectures. A new

(Concluded page 47)

SMOKE PREVENTION ABSTRACTS

Acknowledgments are made, where required, to the Abstract sources indicated

82. Heat Pump for Space Heating: Résumé of Information. Onslow, D. V. (Brit. Elect. and Allied Industries Research Asscn. Tech. Report No. Y/T7, 1947, through Ind. Heat. Engr., July 1947, 9, 150). This report, which includes a bibliography, summarizes the conclusions arrived at in about 89 papers, etc. It is divided into sections covering efficiency, sources of heat, the refrigerant, operating costs, some existing installations, etc., and it concludes that a heat pump installation can result in considerable savings of high-grade energy (equivalent to several times the amount expended), but that the full economic benefit of the system is not obtained unless summer air conditioning is also employed. Two important factors in relation to efficiency are the temperature of the low grade heat source, and the interval through which the heat energy has to be pumped.

83. Gas and Solid Fuel Domestic Boiler (Gas Light and Coke Co., F. J. Eaton and D. R. Wills, Brit. Pat. 587650, Appl. Date 22 Dec., 1944). *Claim 1*—A water heater primarily for domestic purposes and adapted to be fired alternatively or at the same time by solid fuel and gas, which has separate combustion chambers for the solid fuel and the gas situated wholly or largely within the waterway or waterways of the water heater, separate flues leading from the chambers to a common outlet duct, a change-over valve by means of which either of the flues may be isolated from, or both of the flues may be left in communication with, the common outlet duct; and a down-draught diverter positioned in the flue between the gas combustion chamber and the change-over valve. (B.C.U.R.A.).

84. District Heating Plan for City of London (Electrician, 17 Oct., 1947, 139, 1,158). A recommendation that district heating by the heat-electric

system be provided for the areas of the City of London that have to be rebuilt (250 acres) has been submitted to the Court of Common Council. The estimated cost of the scheme, which is planned in four stages, covering 30 years, is £7 million, and it is computed that by 1977 there would be a saving of 103,000 tons of coal a year, and that the average price per therm of the heat supply at consumer's premises would be reduced from 8d. to 7d. or possibly 6.5d. per therm, compared with 1s. a therm average cost from coal or coke burning central heating boilers. It is proposed that the heat shall be generated and sent out from two or three power stations outside the City boundaries and either additionally or alternatively from the new power station at Bankside. The supply of heat for hot tap water would be served from the distribution mains in a closed circuit through a calorifier in each block of a capacity to meet a demand of 5 gal. per head of day population per 12 hours. The scheme is outlined in a report prepared by S. B. Donkin.

85. Anthratube Shown to Public (Coal-Heat, Nov., 1947). The anthratube was shown to the general public for the first time on 23rd October by Anthracite Institute, U.S.A. The tube is now being produced by several manufacturers for home installation. Models shown were of bin-feed and hopper types. The latter can operate on one filling for several days. The President of the Institute, F. W. Earnest, Jr., said: "Since the principle was announced three years ago it has been subjected to intensive research and widespread testing, including year-round operation in 150 homes. In these home installations, under conditions of actual use, it has been shown to operate at 80 per cent. or greater efficiency."

A Bonus System for Boiler Firemen—*concluded*

interest was taken in the CO₂ meters, the Lea Recorder, draft and temperature gauges. Any defect about the plant was immediately reported and the so-called firemen are rapidly turning into what might be called combustion engineers.

The firemen have a mess room of their own attached to the boiler house, also sprays and lockers. Most of the men come dressed to their work and change into their working clothes before going on duty. The firemen on duty now remain in the boiler house at the end of their shift, till the relieving man has had a look around the boilers and is satisfied with the hand-over.

In every way this bonus has been a complete success.

SMOKE

Arnold Marsh

"The most complete popular account of the smoke problem we have yet seen. The case he makes out for immediate, though gradual and cumulative, action cannot be neglected in any complete policy for the ordered exploitation of our fuel resources."—*Manchester Guardian*.
 "Here is the complete picture. Admirably produced with appendices and a full bibliography, *Smoke*, is illustrated with a host of quite exceptional photographs. It is to be hoped that it will appeal to a wide circle of readers."—*Gas Journal*.

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W. R. HORNBYS STEER, M.A., LL.B.

Recorder of South Molton, Standing Counsel to the National Smoke Abatement Society

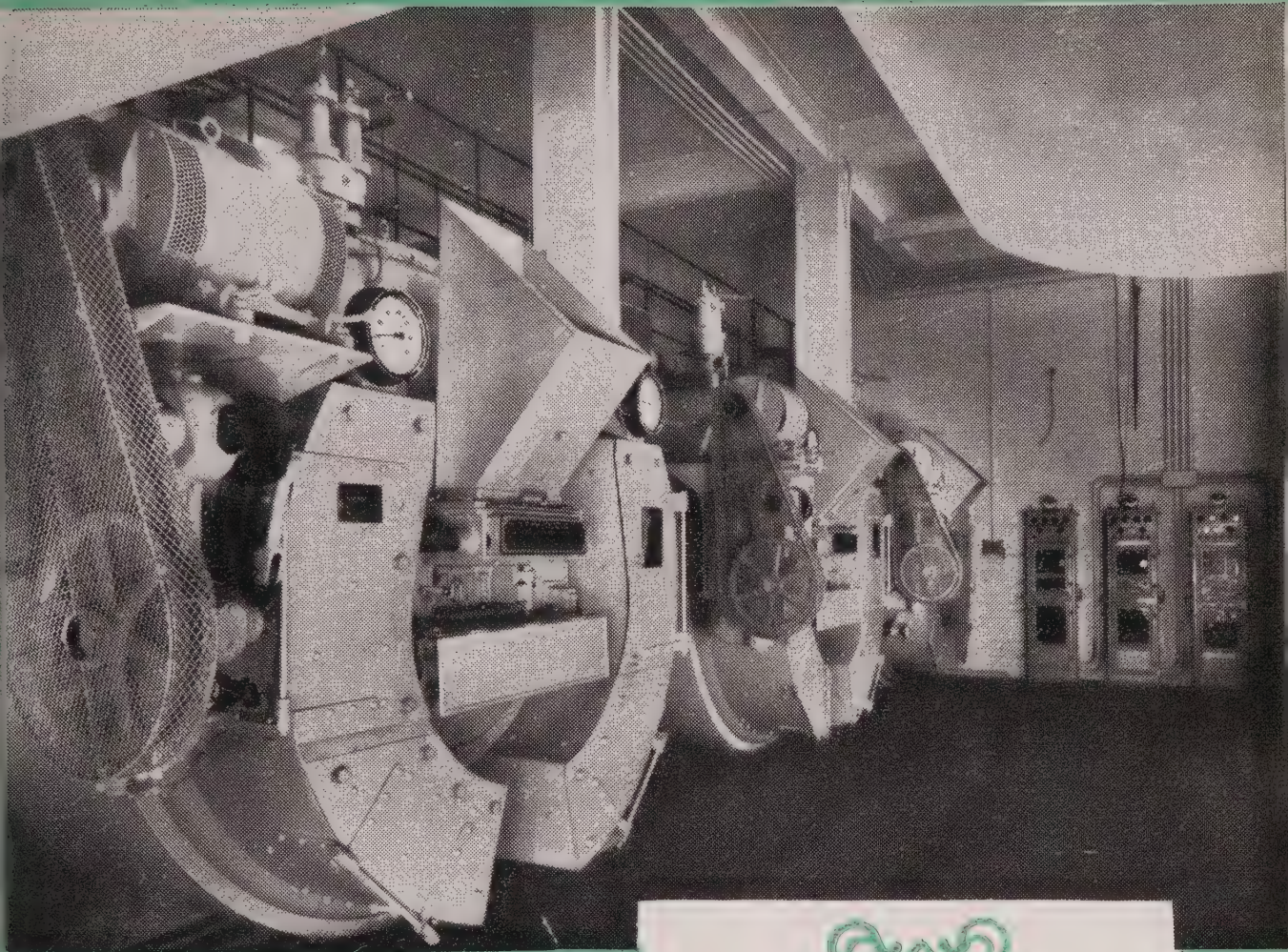
The book fully covers the law as it applies to England and Wales under the Public Health Acts, 1946, and other legislation. In addition to chapters on History, Common Law, Private Houses, Trade Premises, London, Shipping, Railways, Vehicles, and Joint Action, it contains tables of statutes and cases and the relevant sections of the principal Acts concerned.

★ The revised edition includes new material on the important City of London (General Powers) Act, 1946, and the Manchester Corporation Act, 1946, in each of which the new policies for smoke prevention are reflected.

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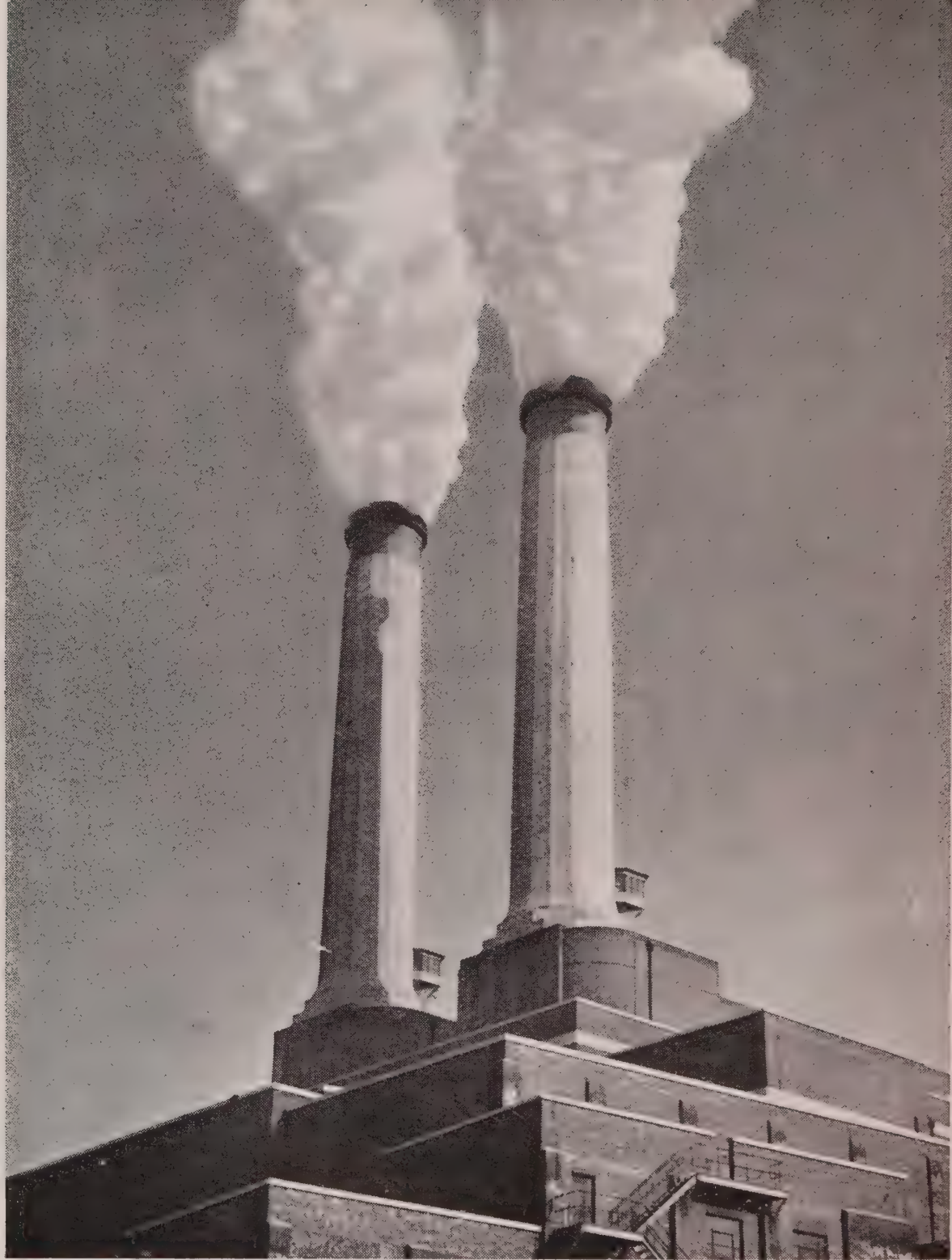
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SMOKELESS AIR

THE SMOKE ABATEMENT JOURNAL



No. 67

SUMMER • 1948

ONE SHILLING

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The housewives got their hot water . . .



but somebody deserved to get into it!

At a certain factory, the cost of steam seemed to be excessive, so the Ministry's Fuel Engineer was called in. He discovered that the condensate was allowed to run to waste through a pipe to an open drain in the road.

This was a popular practice with the local housewives who were able to collect hot water by the bucket, but a rank bad one from the point of view of industrial economy. A pumping trap was recommended and, by this means, all condensate was returned for boiler feed, and down went the cost of the factory's steam.

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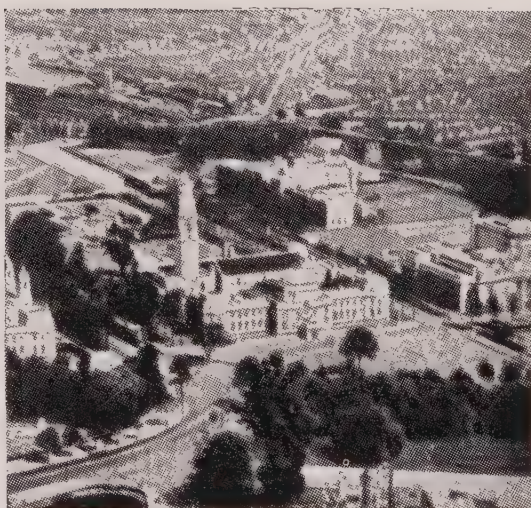
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“Commerce Weekly.”

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Type of appliance	Services provided	Efficiency
Convector Open Fire	Space heating for more than one room	50%
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(22)



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GUILTY CHIMNEYS

The Evidence of Authorities Against Smoke

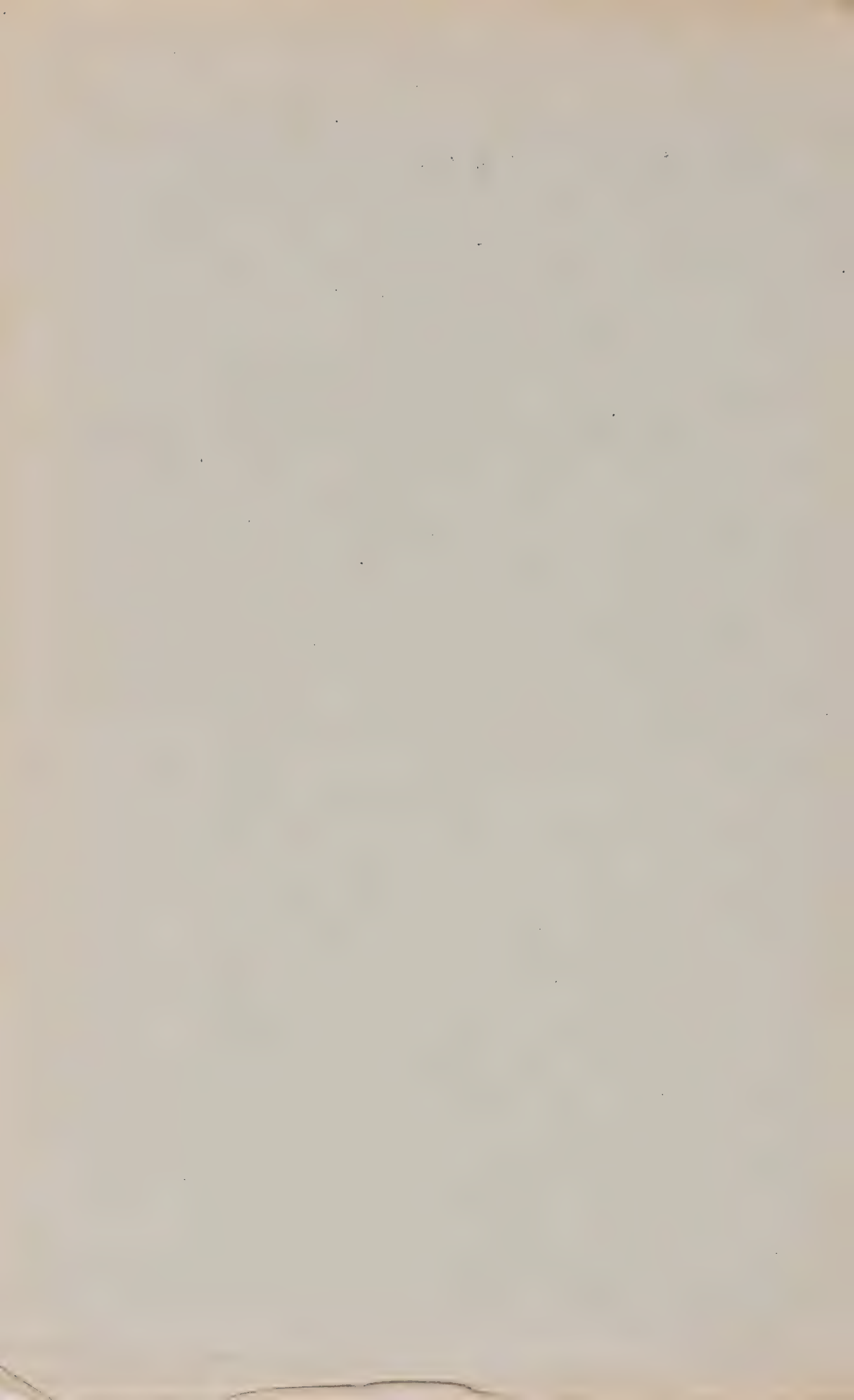
A completely revised edition of *The Case Against Smoke*, published in 1935 and now out of print—one of the Society's most successful publications, which was not only a very readable introduction to the problem of smoke but was—and still is being—widely used by speakers, teachers, and writers in search of facts and quotations that are reliable and to the point.

The present pamphlet follows similar lines by means of passages from scientific and official reports and the statement of experts. Its scope has been widened, and important new evidence has been incorporated. With photographs and a four page inset of charts and diagrams in colour.

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OFFICIAL NOTICES TO MEMBERS

Annual General Meeting

The Annual General Meeting will be held at Cheltenham on Wednesday, 29th October, 1948, at 3.45 p.m. A formal notice and agenda is being sent to all members and representatives of members.

Amendment to Constitution

A resolution, approved by the present Executive Council, will be moved at the Annual General Meeting for the purpose of so amending the Constitution of the Society that elections of Officers and Council shall be held every other year instead of every year. Among the reasons for this motion is that at present the Council can hold only four or five meetings, and its Committees possibly even a smaller number, before their work is interrupted by new elections. It is considered that there would be better continuity and working if the Council was elected for two-year periods. In addition, the elections cost the Society £50 or more in printing and postages, and take up a considerable amount of staff time during the busy

conference period. The amendment cannot, of course, take effect until 1949 and will have no bearing on the elections now in progress.

North-East Divisional Council

Informal talks on the formation of a Divisional Council of the Society for the North-East have recently been held, and members and representatives attending the Cheltenham Conference are being invited to make contact there with Alderman Hancock, of Gateshead, and Alderman Chapman, of Newcastle-upon-Tyne, members of the Executive Council, to discuss the possible holding of a meeting in the autumn to set up a Divisional Council. Other N.E. Division members, not attending at Cheltenham, who are interested and willing to co-operate, are invited to inform the General Secretary. An invitation to attend any meeting in the area would, of course, be sent to all members, representatives and associates.

The Minister of Fuel and Power

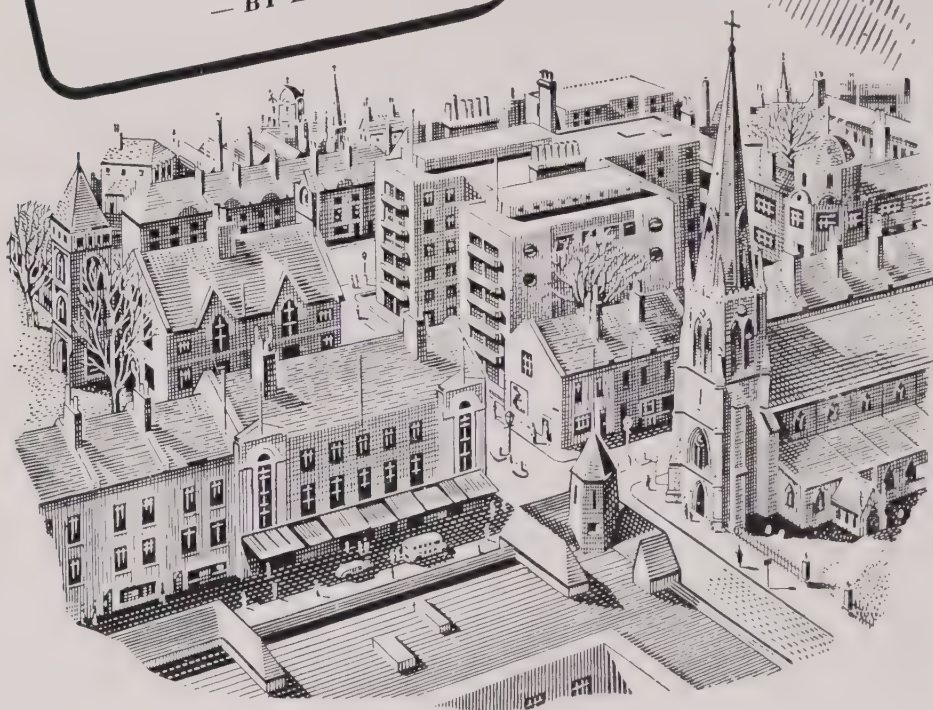
As we go to Press, we are pleased to be able to announce that the Minister of Fuel and Power, the Rt. Hon. Hugh T. N. Gaitskell, C.B.E., M.P., has kindly accepted an invitation to be present at the Cheltenham Conference, and that he will address the Conference at the opening session on the morning of Thursday, 30th September. Mr. Gaitskell has shown the keenest interest in the smoke problem, and a reference to a recent speech will be noted in an editorial comment overleaf.

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Smokeless Air is the official organ of the Society, but the views expressed in contributed articles are not necessarily endorsed by the Society. Abstraction and quotation of matter are permitted, except where stated, provided the usual acknowledgments, including the name and address of the Society, are made.

SMOKING
STRICTLY FORBIDDEN
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*Ships, towers, domes, theatres and temples lie
Open unto the fields, and to the sky ;
All bright and glittering in the smokeless air.*

SMOKELESS AIR

Take the Smoke out of the Cities

IN speeches at public functions Ministers can pick and choose what they say. Unlike a possibly unavoidable reference or answer in Parliament, if they go out of their way on such occasions to speak of something that need not have been mentioned, there must be a reason. We are therefore particularly appreciative of what the Minister of Fuel and Power, Mr. Hugh Gaitskell, M.P., said about smoke at the annual luncheon of the Institute of Fuel in London on April 22nd.

After speaking of the need for a national fuel and power policy, of which

the first stage, now beginning, is the co-ordination of the production and distribution of coal, gas and electricity—a policy for long desired by the N.S.A.S.—the Minister continued :

“ We must also take into account the serious cost of smoke pollution—a factor which is too often ignored in any discussion of relative fuel costs. I want to see the smoke taken out of the cities of this country and in due course—we cannot do everything at once—I hope to see in operation a plan to achieve this.”

There is good reason to believe that the plan is no mere aspiration, and although it is yet too soon to talk at length about the Ministry of Fuel and Power's interest in smoke prevention

we can say that their concern is genuine and very active. It has already been stated that the Government accepts the main conclusions of the Simon Report, and, despite the many difficulties of the times, we are confident that this is not mere passive acceptance.

Consumer's Choice

After his reference to smoke the Minister concluded his speech by saying: "Finally we must aim at creating a full information service for consumers so that they may be able to make a proper choice of the type of fuel or appliance that they want. We have no wish to dictate to consumers what they should use; we propose to give them the full facts and let them choose for themselves."

We can all endorse this too, although the Society would wish to qualify the last sentence by excluding from the freedom of choice of fuel and appliances bituminous coal and the old, extravagantly wasteful, appliances. Within the field of smokeless methods and in accordance with the needs of the overriding national fuel policy there can and should be complete freedom of choice. There is a stiff job ahead in persuading the majority to accept the fact that bituminous coal should be used for limited, approved purposes only, but once the case is understood it will be approved, just as it has been already in some of the American cities. As regular customers at the chemist's shop we are not conscious of any loss of freedom of choice because we cannot buy dangerous drugs except by special permit.

The Retiring President

The first occasion we have had for obeying Clause 17(a) of the new constitution becomes a matter of serious regret. It stipulates that a president of the Society cannot be re-elected to that position after two years of office. This, of course, is the only reason we have for allowing Sir George Elliston to retire, for his services to the Society have been considerable and fruitful, and in the Chair at conferences and other events he has been what one

would call an ideal President if the adjective was not a little too cold and austere for the warm affection and respect he has created. Members attending the Cheltenham conference will be glad to note that Sir George will give the Presidential address, as the retiring holder of that office, on that occasion.

—And the New

From the nomination papers they will have received members will already be aware that Lord Simon of Wythenshawe has agreed to be nominated, on behalf of the Executive Council, as the new President of the Society. Lord Simon will need no introduction, although to some of our newer members his work for smoke abatement extends much farther back than they may be aware. The chairmanship of the Advisory Council of the Ministry of Fuel and Power, the report of which on Domestic Fuel Policy is now usually called "the Simon Report," is simply the last—to date—of his many services to the movement. A more complete account will be given after the election is over—although any other nomination is the last thing we expect—and at the moment we need only express our feelings of pleasure and privilege.

The Heart of the Matter

So many medical men still fail to appreciate the multifold effects of smoke on health because they do not conform to the usual statistical framework of disease analysis. The effects are not to be seen directly—except occasionally—in the mortality tables or even in the sickness lists, but rather in the overall lowering of the general level of positive health. Smoke prevention is above all things part of the great work of preventive medicine that should, logically, come before curative medicine. Dr. Brockington, Medical Officer of Health for the West Riding of Yorkshire County Council, in his recently published Annual Report for 1946, reaches the heart of the matter in a single forceful sentence that we have italicized in the quotation that follows:

"Smoke pollution of the atmosphere over the West Riding continues to be excessive and is discouraging to all workers in the field of public health. *The adverse effect on health is generally considered to be great, and it is a contradiction of the principles of positive health when the air that people breathe contains dust and soot capable of causing solid deposits to the amount of upwards of 150 tons per square mile each year; it is the negation of preventive medicine to establish hospitals, a large proportion of whose beds would be redundant in a clear atmosphere.* The time has come for a crusade to awake public conscience. Why did we feel so strongly 100 years ago about the devastations of cholera and to-day cannot raise any zeal about smoke where damage to health is greater by far? It is incongruous that we should in England to-day be formulating plans for a National Health Service and yet leave the air we breathe loaded with dust. The remedy is at hand, it is only necessary for us to feel strongly about it. From this point of view the shortage of coal has already been of great benefit to the West Riding, but the elimination of smoke by cutting down the quantity of coal burnt cannot itself provide the whole answer. The compulsory use of semi-distilled coal by households and industries alike would have far-reaching effects."

The Smoke Production Poster

Protests about the "More and More Production" poster, with its black smoke, on which we commented in our last issue, were made to the Departments concerned in a letter from the President on behalf of the Executive Council. The letter expressed our "emphatic protest and astonishment that, in order to emphasize the necessity for production, it was thought necessary to use an illustration that implied at the same time a great waste of the nation's fuel."

A reply from the Central Office of Information expressed real concern that the poster should have given offence to the Society, "with the objects of which

we have the greatest sympathy." It went on to say that it was assumed that no one could conceivably see in it an implicit advocacy of fuel waste, and that "it is our belief that people readily detect the significance of this poster as a symbol of increasing production and are in no way inclined to confuse it with such issues as those of smoke prevention and fuel economy."

The matter was further raised in a question asked in the House of Commons by Mr. Keeling on 10th June. He asked the Economic Secretary to the Treasury "whether he was aware that black smoke represented unconsumed fuel and whether he would withdraw the poster and substitute another emphasizing that the prevention of smoke, rather than its emission, assisted production."

In reply, Mr. Douglas Jay said: "Yes, sir, I have certainly seen this poster, which has now been on the hoardings for 14 weeks and will shortly be replaced. A smoking chimney is generally associated with the idea of full production, but we certainly do not wish to run counter to the movement for smoke abatement with whose aim the Government is entirely in sympathy."

The poster created so much controversy that we may feel that, on balance, it may have done the smoke abatement more good than harm. Thanks to the objections voiced it has increased what we want most—active smoke consciousness—and has helped through this to disperse that persistent "where there's muck there's money" fallacy.

Frontispiece

Our "smokeless air" frontispiece that heads these notes is appropriately enough a scene in the Cotswolds, and is reproduced from the Cheltenham official guide. For the sake of any readers whose minds may be as impudent as our own we hasten to add that the scene has no relation or reference whatsoever to any past or forthcoming conference.



Conference at Cheltenham

ARRANGEMENTS for the 1948 conference are now complete.

It will be an "easier" meeting than last year at Edinburgh, where the programme was rather too long and a little too heavy for some delegates. This time the sessions will be fewer and shorter, and the subjects to be discussed are on the whole less technical.

An interim report on the Society's "National Survey" of pollution will be the opening feature. A new way to focus attention on activities of note from all parts of the country will take the form of a series of twelve or more "Progress Reports," which will be discussed but not read or introduced. From the wider fields surveyed in these two sessions two important papers by specialist authors will consider particular aspects of the problem that are bound to be of interest to every member and delegate present. Mr. Leslie Hardern, who is Public Relations Officer to the Gas Light and Coke Company, and a member of the Society's Executive Council, will present a paper on "Smoke Abolition and the Public—Problems of Education and Propaganda," and Mr. J. Nelson Meredith, City Architect for Bristol,

will deal with "Smoke Abatement in Relation to Town Planning." We anticipate that for long after the conference we shall be able to make good use of these contributions to our literature.

Finally, the Society is breaking new ground—as far as it is concerned—in having for the last session a Brains Trust on smoke prevention and clean air. A first-class team of "Brains" has been chosen, and the conference will have an opportunity of asking the many questions that are normally crowded out. For this session we are inviting parties from schools and interested organizations in Cheltenham, so that some useful general propaganda can also be secured.

Delegates will be invited by the President and Council to tea after the Annual General Meeting on the Wednesday afternoon, and on the Thursday evening they will be invited to a Reception by His Worship the Mayor of Cheltenham (Councillor H. T. Bush, J.P.). The proceedings will close on the Friday evening with a dinner—which will end not with speeches but with some music and magic.

Scottish Conference at Dundee

THE Scottish Division held their Annual Conference in Dundee on April 30th last when the number of representatives attending had to be limited to the accommodation available. Ninety-seven delegates attended and showed their interest in the activities of the Society by the varied questions put to the speakers during the discussions. A most encouraging feature was the goodly number of delegates sent by organizations other than local authorities who can always be counted on for their support. The Electrical Association for Women, Ratepayers' Associations, Local Ward Committees and others all made their presence felt.

The morning session consisted of two papers one by Mr. Thomas Ashford, A.M.I.MECH.E., Senior Smoke Inspector, Corporation of Glasgow, on the subject of "The Duties of Local Authorities as regards Air Pollution Administration" and the other by Mr. Barry Cuthell, on the subject of District Heating with special reference to the District Heating Scheme at Stirling Park, Dundee. Reference is made elsewhere in this issue to Mr. Ashford's paper and it is sufficient here to say that the success of his effort is confirmed by the demand received for copies of his paper. Mr. Cuthell confined himself to the practical experience gained by the Corporation of Dundee in operating their District Heating Scheme and during the tour of inspection of the plant in the afternoon informal meetings were held in the open air, when Mr. Cuthell was inundated with questions regarding the advantages or otherwise of this form of heating over other methods. Occupiers of houses in the area served, provided delegates with useful data on the views of those at the receiving end.

A visit was also made to the generating plant in a new factory belonging to Messrs. James Keiller & Son, Ltd., Confectionery and Preserve Manufacturers. The boiler installed in this factory is of the "Super-Lancashire"

type fitted with a Hodgkinson Automatic Coking Stoker and operates on balanced draught. What seemed to be of particular interest to the delegates was the instrument panel on the boiler which contained

- (1) The C.O₂ recorder.
- (2) Steam Flow Indicator giving
 - (a) the immediate rate of steam flow, and
 - (b) the total amount of steam produced.
- (3) Thermograph showing temperature of feed water.
- (4) Thermograph showing
 - (a) steam production, and
 - (b) steam demand.
- (5) Thermograph showing "exit" temperature of flue gases.

Perhaps it was the combination of the usual Conference Hall procedure with the practical demonstration of the working of plant on the site together with the excellence of the weather, which created the feeling amongst those present that the National Smoke Abatement Society had succeeded, that day, in convincing those present that with co-operation and a united effort of all interested great progress can be made towards achieving throughout the United Kingdom the maximum of light and air free from every form of pollution, and particularly that arising from the combustion of fuel.

London and Home Counties Smoke Abatement Council

At the annual general meeting of the Greater London Advisory Council for Smoke Abatement, held at the House of Commons on 12th May, 1948, the constitution was amended so that the name of the Council becomes as shown above, and the boundaries are so extended that they now enable to become members all the local authorities in London and the Home Counties of Berks., Bucks., Essex, Herts., Kent, Middlesex and Surrey.

World Wide Smoke

A Digest of Recent News Items

ATMOSPHERIC pollution in one form or another is a world-wide problem, and cuttings from papers in the English-speaking world give us some idea of what is being encountered and how it is being studied and overcome. A short account of recent events will not be without interest and may be helpful in showing us where we lead, and where we lag behind, other countries.

Montreal

Pollution problems seem to have become more acute in recent years in Canada. Montreal, for example, is in the news with complaints about road dust, oil fumes, gas fumes, nauseating odours, railway smoke, and smoke in general from "numerous factories." One newspaper letter writer says that after living in the city for forty years he is making plans to take his family "far away from their unhealthy diet of soft coal smoke." Railway smoke led to a deputation from Montreal and Westmount being sent to interview the Ministers of Finance and Transport at Ottawa. "Freight yards," says the *Montreal Daily Star*, "extend for miles westward and shunting engines and factory chimneys add their quota to the smoke clouds which hang over a wide area all day long, and in certain conditions create not only an almost unbearable annoyance but a menace to public health."

New Smoke Law for Toronto

If their estimate of a deposit of 54 tons per square mile per month is at all comparable with our British records, smoke is certainly a serious matter in Toronto. Dr. William Robinwon, pathologist, is reported as saying: "Of all the autopsies I have experienced in Toronto I have seen only one pink lung and that belonged to a girl who had recently arrived from the country. All the other local lungs were blackened by soot."

What is called "hopelessly inadequate" and "horse and buggy" legislation against smoke was obtained in 1910, but now a new law is being drafted. This is based, after a lengthy investigation, on the lines of the "most up-to-date anti-smoke byelaws in power in large industrial cities in the U.S." (Montreal did not come to Britain for guidance, it may be noted!)

The new law provides for a continued educational campaign with plant owners and operators; removes "blanket" exemptions; provides for the use of the Ringelmann chart; limits dense smoke emission to 6, and light smoke to 10, minutes an hour. It provides for the control of gas fumes, fly-ash and solids, enforces the use of dust-separating equipment and the installation of smoke indicators. It also requires permits for new installations or major alterations to fuel-burning equipment, and provides for the setting up of a seven-man board to consider appeals from the decisions of the smoke inspectors.

The City's Bill has been approved by the Ontario legislature despite some opposition from a metal company and a brick company and the declaration of the latter that "smoke is an indispensable part of our industry."

The Campaign in New York

As recorded in SMOKELESS AIR for Summer, 1947 (No. 64) new plans for smoke prevention in New York had to be deferred because the Health Department could not secure the additional funds required. Within his present budget, however, the Health Commissioner, Dr. Weinstein, has established a smoke control unit in the department's Bureau of Sanitary Engineering. Meanwhile, the "Committee on Public Co-operation for Air Pollution Abatement" has prepared a pamphlet "Clean Air for Your City,"

which is being distributed among unions and civic and business organizations.

The Sanitary Code makes violations of the existing ordinance punishable with a maximum of \$500 fine and a year's imprisonment, but says the *Herald Tribune*, "the greatest flaw in the existing provision has been the fact that the Health Department has traditionally acted only on actual complaints of excessive smoke emanating from designated chimneys." The department has, however, been active on an educational campaign, and without a single court summons the inspectors have persuaded owners of 101 industrial plants to improve furnace equipment and make it smokeless, involving an expenditure of over 8 million dollars.

The *Herald Tribune* says that a basic difficulty is that during the war the regulations forbidding the use of bituminous coal except in specially equipped furnaces were waived because of the coal shortage, and that this condition continues.

Teething Trouble in Pittsburgh

Pittsburgh possesses powers not only for prior approval, but, like St. Louis and Cincinnati, for controlling the kind of fuel used. Last October this control was extended from industrial and large-scale heating plant to all domestic premises. Unless the appliance in which the fuel is burned is of an approved type (e.g., automatic feed) low-volatile or other smokeless coals only may be used. In this country we are still some distance from this, perhaps the only really effective method for smoke prevention, and we envisage progress by stages, in the form of smokeless zones, rather than by the complete control of fuel throughout a city in one step. Pittsburgh's new law seems to have been having its teething troubles thanks to the exceptionally cold winter and consequent difficulties over the larger supplies of smokeless fuel required. A black market in bituminous coal is alleged to have come into being, and a deputation of housewives to the City Hall

protested against the shortage of smokeless fuel and its additional cost. A news report says: "The women aren't against the idea of smoke control but they want cleanliness cheaper."

Already, however, Dr. Sumner B. Ely, Superintendent of Smoke Prevention, reports that some parts of the city show marked improvements in soot deposit figures—10, 20.7 and 21.7 per cent. reduction, although in the cleaner residential parts there are only small changes. Many citizens, especially housewives, are commenting on the increased cleanliness in their homes.

The area surrounding Pittsburgh, Allegheny County, is now planning to keep in step with the city, and a County Smoke Department, under Mr. Thomas C. Wurts, has been set up and is making a thorough survey of the problem.

Cincinnati

Similar restrictions on bituminous coal in Cincinnati, introduced last autumn, have also been interfered with by the icy winter, and in January it was decided to suspend until 1st March the ordinance banning the use of high-volatile coal in hand-fired equipment.

Los Angeles

We do not usually associate sunny California and Los Angeles with air pollution, but trouble has been increasing over a wide area, not confined to the city. Miscellaneous fumes and not coal smoke are said to be the main factor, and investigation has shown that these are periodically trapped by Pacific winds that form a temporary lid over the topographical saucer in which the district is situated. At such times fume-laden mists, reducing visibility to a few hundred yards, are experienced.

Control is being established on a county basis, and an organization has been set up under Dr. Louis McCabe, an engineer from the U.S. Bureau of Mines. He has asked for an appropriation of \$178,000 and a staff of 47 engineers, research men, inspectors and office workers.

Any installation, other than those in a private house, which emits noxious fumes, will have to be licensed, and the licence will be contingent on the

installation of adequate fume-suppressing apparatus. Penalties for violation of the law will not be fines, but the revocation of the offender's licence to operate. The first action against a major industry to be reported is for the revocation of the smoke-control permit of the Columbia Steel Company's plant at Torrance.

Other U.S. News

Washington, D.C., is showing concern over smoke (or "smog" as the Americans often call it); Salt Lake City has voted for a new ordinance to check railway smoke; Omaha, Neb., is considering a new ordinance to set up an organization similar to that in other cities, with powers of prior approval and for an annual inspection of equipment; Philadelphia's mayor has asked for a new smoke ordinance and the creation of a division of air pollution control with a 1948 expenditure of \$55,000; Detroit has passed a new ordinance restricting the use of high-volatile coal in private households except where mechanical firing is used.

South Africa

Public protests have been held at Umbilo about the emission of coal dust and ash from the Congella Power

Station of the Electricity Supply Commission. A report of the Commission said that progress in alleviating the trouble was being made, despite the loading of the plant to capacity. Modern and efficient dust precipitator equipment had been ordered from Great Britain.

End Pieces, with Music

Professor Kern O. Knudsen, acoustics expert, told a symposium on sound at the University of Utah that smog is highly effective in absorbing high-pitched noise, such as is made by whistles or high-speed machinery. It has little effect, however, on low, rumbling sounds.—*Engineering News Record, N.Y.*

Extract from a Newfoundland newspaper, as printed: "A Los Angeles county has started a comprehensive anti-song programme to ensure residents getting full value from the California sunshine. An air pollution expert with broad powers to enforce anti-song regulations. . . . Experts agree that song control is most effective if tackled on a county-wide or regional basis."

We only hope the sub-editor responsible hasn't a smog in his heart!

Water in the Fuel Ration

*The Editor,
Smokeless Air.*

Sir,

Your correspondent, Mr. J. O. Cooke of the London and Counties Coke Association, states that "it is generally recognized that a minimum figure of 3 to 4 per cent. moisture content is the least which is desirable . . . in a domestic fuel." I should like to ask Mr. Cooke what are the grounds that make this moisture content desirable? I can assure him that, as a purchaser of domestic fuel, with the present price of coke at over 80 shillings per ton, I consider it most undesirable to pay from 2.4 to 3.2 shillings (as a minimum) to from 6.4 to 8 shillings (the maximum "advisable") for *water*

when I buy a ton of domestic fuel.

As a purchaser, my object is to buy potential heat and not water. Should I consider it advisable to moisten my fuel, that can be done much more cheaply by using some of the dirty water that has been used for washing up. This attitude that the customer must accept what is considered good for him is one of the evil outcomes of restrictions, inevitable in time of war, which apparently are to be perpetuated in time of peace. I would reiterate, moisture and mineral matter are not *fuel*, and to charge 80 shillings a ton for constituents that are entirely useless is a gross imposition.

G. W. HIMUS

London

SCULPTURE IN THE OPEN AIR

"It is this horrid Smoake which obscures our Churches, and makes our Palaces look old, which fouls our Clothes, and corrupts the Waters, so as the very Rain, and refreshing Dews which fall in the several Seasons, precipitate this impure vapour, which, with its black and tenacious quality, spots and contaminates whatever is exposed to it.—*Calidoque involvitur undique fumo.*" (John Evelyn, 1661.)



Public interest in the exhibition of sculpture in Battersea Park has been greater than was anticipated. Perhaps Londoners are enjoying the novelty of seeing, at one time, so much statuary all so clean and so strangely white. But the *Times*, in a leading article, wonders whether grimy London is a proper place for sculpture.

"Those who visit the present exhibition in sunny weather," says the leader, "will have an idea of the appeal that open-air sculpture can make in the clear atmosphere of southern Europe. The London soot, which falls with devastating impartiality on bronze, stone and marble alike, will hardly be able to make an impression on these sculptures during one summer, but the damage that London's statuary suffers in the long run can be indicated by an estimate once published in the *Lancet*

that fifteen tons of solid matter are deposited on each square kilometre of London in an average winter month. . . ."

All too true. For visual proof we publish on the left a photograph of one of the most impressive of the Battersea exhibits, and below a recent photograph of one of the figures ("Night") by Epstein, once the subject of heated controversy, on the Underground building at St. James's Park. We are not concerned with style, form or idiom in the two examples, but only with the appearance of their surfaces. The one is new, clean and gleaming; the other is so smeared with London's soot that its massive, brooding dignity has become almost a caricature of what it was once. But there is no need to labour the point. Every picture tells a story



Smoke—and the Curtains

By T. C. Petrie, F.C.S.

(*Laundry Technologist and Consultant*)

THE vulnerability of textile fabrics and furnishings to the acid products of combustion depends upon their chemical composition in the same way as that of buildings, metals, and so on. The vegetable fibres such as linen, hemp, cotton, ramie and jute are examples of cellulose. The rayons have a basis of cellulose. The animal fibres, wool, fur, the hairs, have nitrogen and sulphur in addition to the carbon hydrogen and oxygen of cellulose, whilst silk is without the sulphur. The cellulose group are particularly prone to acid damage but the animal are much more resistant. Acids such as sulphurous and sulphuric reacting with cellulose fibres produce a water-soluble form of cellulose — hydro-cellulose. Cellulosic fibres after exposure to these acids become excessively tender having lost their tensile strength. The effect of these sulphur acids on some classes of dyes is to either reduce the intensity of their colour or in some cases to discharge it altogether, sulphurous acid being an excellent reducing agent. Those who carry out chemical investigations of textiles are aware of how quickly fabrics become acid in the acid atmosphere of a city. Goods which have been laundered and finished with starch may well be slightly alkaline due to the presence of borax in the starch to improve its glazing property, but atmospheric acidity rapidly neutralizes this alkalinity.

Curtains

The housewife is familiar with the fact that launderers and dry cleaners will only accept curtains "at customer's own risk" because of the general frailty of such articles arising from atmospheric conditions. Curtains suffer badly because hanging at open windows they act more or less as filters and are an ideal catchment area for dust, soot and the ubiquitous acidity. In this

country there are frequent and considerable changes in the amount of water-vapour in the atmosphere and it is this variation in humidity that assists the sulphur acids to do their deadly work with fabrics. Water vapour hydrolyses sulphurous acid, the result is sulphuric acid, which the curtains absorb. The atmosphere becomes less humid, the absorbed acid concentrates. A more humid spell sets in, a fresh quantity of acid is absorbed and so the cycle of absorption and concentration goes on. The sulphur acids are electrolytes and as such are extremely chemically active in low states of concentration.

Curtains weakened by such conditions of exposure frequently give way in a characteristic manner by splitting in parallel lines. These splits represent the curves or convolutions of the fabric as it drapes or hangs. The flat surfaces between the curves although weakened, persist. The reason why the convolutions suffer to a greater extent is due to the fabric being held under a state of stress which leaves the fabric structure more open and therefore offering greater permeability and absorption of the acid. In a city subject to dense and black fogs, clean curtains call for rewashing after only a few hours' exposure. The need for greater frequency of washing is not conducive to longevity, but the chemical constituents of atmospheric soiling are probably much more deadly in their effects because of their catalytic and electrolytic actions. Metallic particles, iron, copper, zinc, etc., are known constituents of city dust. Iron and zinc are good catalysts and with the acids reacting localize and concentrate the chemical destruction of the curtains, the outcome of which can often be seen as a band of discoloration and damage marking the position of the window

opening. Fabrics of wool or silk after a period of exposure to an acid atmosphere are noticeably sticky to handle and creak or "scroop" when compressed in the hand. If the seaming yarns are of dissimilar fibre such as cotton, the yarn can completely break up on placing the curtain in a soaking tank. Rugs and curtains withstand acid damage for a considerably longer time than carpets, there being a two-fold reason for this, first the pile of the carpet is of acid resisting wool, which being thrown to the surface in weaving provides good covering and protection for the ground fabric which may be of linen, cotton, hemp or jute. The vegetable yarns form the anchorage for the woollen pile yarns and are heavily dressed with starch which imparts stiffness and density to the woven structure.

Carpets

Under conditions of wear the backing yarns gradually lose their protective coating of size and at last a yarn breaks releasing a strand of the woollen pile. If such a strand is pulled it is noticeable how the crossing and binding yarns of the ground fabric give way with a snap as each one breaks, offering but little resistance to the pull exerted on the pile yarn. Although these snapping yarns have been protected by the pile fabric, what is it that causes their weakened state? They are the yarns composed of vegetable fibres and have been attacked and weakened by the sulphur acids which they have absorbed. If the carpet lies on felt, the black lines which mark the position of the floor boards demonstrate that the felt has acted as a filter retaining the solid particle soiling which has been carried on the draught up between the floor boards. Felt being non-absorbent, has trapped the solid particles but allows the acid moisture laden fumes to pass into the absorbent vegetable yarns forming the backing of the carpet, so they are attacked and weakened.

Linen

Bed and table linen suffer badly from atmospheric conditions. As a rule both table and bed linen such as sheets

and pillow-slips are heavily dressed with starchy matter when new, and are finished under considerable pressure and friction which imparts to them a highly glazed and unbroken surface due to the flattening of the yarns when in the damp and plastic state, giving that almost porcelain-like appearance associated with new linen.

The dressing, more or less, seals the interstices between the two systems of yarn forming their woven structure. Such fabrics are highly resistant to acid attack provided that the conditions of storage are good, i.e., in a dry atmosphere and in a container with a tight-fitting lid and so filled that there is the minimum of air in the container. A sheet of fine linen which had been stored under such conditions and kept in the boiler room of a centrally-heated house for six months was taken in order to ascertain the amount of chemical damage, the result showed only 3 per cent. of chemical damage—the chemical damage was unknown when the sheet was put into storage. The dressing was then removed and the sheet was returned to the house, placed in the linen cupboard which carried the working stock of linen used throughout the house. The house was in South Kensington, the season was the early autumn, the weather was fine and sunny with mist in the mornings and evenings. After five weeks of exposure to the conditions prevailing this unused sheet was again taken for another estimation of chemical damage. It was found that on the exposed folds of the sheet the damage had now risen to 20 per cent. but on the flat and more compressed and protected surfaces of the fabric the damage was 15 per cent. These tests showed how rapid the deterioration of the fabric was, but furthermore that the original dressing protected the yarns and their fibres from the damaging effects of sulphur acids.

In a London hotel a number of thick cotton bedspreads of a honeycomb pattern had been in storage for a number of years. It was decided to put the bedspreads into use but as they were somewhat discoloured at the folds

(concluded on next page)

BOROUGH OF SALFORD. CAUTION MILLOWNERS & OTHERS.

The attention of the Sanitary and Nuisance Committee of the Council of this Borough, having been directed to the large quantity of dense Smoke emitted from the Chimneys of the various Works and Manufactories situate within the Borough, and which, in consequence of negligence and inattention on the part of Engineers and Firemen, or the proprietors not having adopted the necessary improvements, has become an intolerable Nuisance, and this evil having been so repeatedly demonstrated to be within the power of every party to remedy, the Committee therefore trust that Proprietors of Mills, and other Works, will impress upon their Servants the necessity of exercising more caution; that by strict attention, and judicious management in firing up, they may prevent the necessity of legal proceedings being instituted against them for the suppression of the Nuisance, as the Committee feel bound to enforce the provisions of the Act of Parliament in every instance where gross neglect and carelessness is manifest after this Notice.

BY ORDER OF

**THE SANITARY AND NUISANCE COMMITTEE,
CHARLES GIBSON,
TOWN CLERK.**

Town Hall, Salford, June 23rd, 1854.

The Committee request that this NOTICE may be POSTED in the ENGINE HOUSE.

W. F. JACKSON, PRINTER, NEW BAILEY STREET, SALFORD, AND BROAD STREET, MANCHESTER

rebuilt their tenement higher than the defendant's chimney and with windows facing towards the said chimney."

Unfortunately the record does not give the judgment.

(Curiously enough, the very week we received this we had a long telephone talk with a Londoner full of complaint against his neighbour. The complainant lives in a two-storey house, the neighbour in a bungalow hard by, from the chimney of which has recently been issuing dense clouds of smoke from the burning of bituminous briquettes in a domestic boiler. The smoke has caused the complainant to vacate a bedroom that has windows facing towards the said chimney.)

From Our History Book

Above we reproduce a cautionary notice from Salford, dating back almost a hundred years, discovered and kindly sent to us by Dr. J. L. Burn, the present Medical Officer of Health.

Going still further back into the past, Dr. C. F. White, Medical Officer of Health for the City of London, has let us have a copy of the following record, from the Assize of Nuisance for 1377:

"Thomas Yonge and Alice his wife, v. Stephen atte Frythe, armourer, and his landlords. Assize of Nuisance by reason of smoke from the defendant's forge. The plaintiffs says that their neighbours have built a forge the smoke from which enters their hall and chambers so that the value of their tenement is diminished to the extent of 10 marks per annum. The defendants say that any citizen may build a forge with the licence of his landlord and that the nuisance is caused only by reason of the fact that the plaintiffs

Smoke and the Curtains (*concluded*)

naturally they were to be laundered first. The yarns composing the weave were much less tightly twisted and therefore their bulk was much greater than those of a fine linen fabric. The yarns were also dressed to a much less degree than those of linen. The handle of the fabric was somewhat tacky and on testing gave a strong acid reaction. One of the covers was placed in cold water in a soaking tank, the water being sufficiently alkaline to neutralize the acidity. After 30 minutes of soaking, the cover was removed from the tank—in strips. The cellulose had been so weakened that the fabric was unable to support its own weight when wet and simply fell apart down the lines where the more exposed folds had been.

There is no shadow of doubt that fabric furnishings suffer untold damage by the chemical action of atmospheric pollution.

On the Platform

Smoke Prevention at some Recent Conferences

Thomas M. Ashford

ONE of the papers at the recent annual conference of the Scottish Division at Dundee was on "The Duties of Local Authorities as regards Air Pollution Administration," by Thomas M. Ashford, Senior Smoke Inspector, Glasgow. Some passages from the paper were as follows:

"In several areas in Scotland active administrative work in smoke abatement has been engaged in by the local authorities for many years. Naturally, I would first cite Glasgow where control has been effected along the present procedure for 46 years. This administrative position obtained until shortly after the outbreak of the recent war, when, on instructions from the central authority, there was a complete reversal of policy and local authorities were instructed to assist in the formation of a smoke haze, particularly over all urban areas. This policy continued for about three years and then it was indicated that a return to the *status quo* was desirable, and it was left to the local authorities to re-establish such measures of control as the exigencies would permit. When the pro-smoke regulations were rescinded, conditions in the fuel, labour and maintenance fields had so hopelessly deteriorated that administrative action in the control of smoke emission simply did not exist, and during those pro-smoke years until after the end of the late war an anti-smoke complex had developed. The fruits of probably half a century's work had largely been lost and, during the past two years at least, it has meant that the efforts of many local authorities have had to begin from the scratch line. From now henceforth this factor has been clearly realized by this Society and by many of the larger local authorities and is causing them to re-double their efforts to re-educate the mass of the

people to the realization of the evils of the pollution they inhale about every four seconds of their existence. Plant owners, users and operators will have to be approached and technically refreshed in the methods of the management of the respective plants.

The Functional Activities of Authorities

"The following is a number of the activities in which, in my opinion, all large local authorities must engage in an effort to recover the ground lost. In some of these activities other authorities who have no industrial areas within their boundaries can effectively assist and thus enlarge the field of success in the general effort to reduce and effectively control the smoke nuisance.

"1. Statutory control by administration of the powers available.

"2. Special and routine observations of the smoke emission in the area under control.

"3. Surveying the technical changes in plant construction for industrial purposes and assisting changes which are effective.

"4. Supporting and organizing technical courses of instruction in combustion and plant management for operatives, and, if need be, executives.

"5. Undertaking or assisting investigations and research into the problems connected with atmospheric pollution and smoke abatement.

"6. Public education by propaganda and popular lectures.

A New Act Needed

"It is fortunate in Scotland no reference is made to the term 'black smoke.' Technically, of course, there is no such thing as 'black smoke'; the word 'dense' is always used. This word 'black' has led to some trouble under English administration. Before statutory enforcement can be employed

the smoke must either be a nuisance or else be 'black smoke.' It would also be noted from the Scottish powers available that there is no reference to the duration of non-permissible smoke. Here again local authorities are at variance. The standards vary north, south, east and west. Even Edinburgh differs from Glasgow, and I have no doubt that Dundee, Aberdeen, Perth, or any other area will show differences in conception in this regard.

"What is needed is a general Act covering the whole country, wide in its scope and application, yet giving closest guidance in the standards to be maintained and specifying the emission which would constitute a statutory infringement. In addition, other impurities should be included such as grit, sparks, ash and oily vapours. The report of the Committee on Scottish Health Services issued in June, 1936, agreed that existing legislation in this connection required amendment. If the ground lost has to be recovered and further progress made, then a general Act for Scotland cannot be much longer delayed, and I would suggest that it should follow the lines of the Glasgow provision or an amended Burgh Police Act."

F. J. Redstone

Two most useful papers were read at an atmospheric pollution session at the Sanitary Inspectors' conference at Blackpool in June. The attendance at the session was very good, and indicated a growing interest in the subject among the members of the Association. The first of the papers was "Atmospheric Pollution," a wide survey of the problem and of policy for dealing with it by F. J. Redstone, Chief Sanitary Inspector for Bristol, who is a member of the Society's Executive Council and Chairman of its Publicity Committee. Points from the paper :

"It will be appropriate to make reference to the excellent co-operation which exists between officers of the Ministry of Fuel and Power and sanitary inspectors in various areas throughout the country. In Bristol we have

adopted the viewpoint that the Ministry, having supplied the fuel, has some responsibility to assist the industrialist in burning it without nuisance. For this reason, my Department prepared a standard form which is used to refer difficult cases to the South-Western Regional Office of the Ministry. Duplicate forms, with details of the nuisance, are forwarded to the Ministry ; one of these, with the Ministry's observations written in the space provided, is subsequently returned to my office. In this way both Departments have concise details of each case recorded on one sheet.

"Arrangements are made for the offending plant to be visited by one of the Ministry's fuel engineers, and an investigation is carried out to ascertain the cause of the smoke and or grit emission. Suitable advice is given and recommendations made to the firm to assist in overcoming the problem. Where it is found that the trouble is due to inexperienced operators, a visit by one of the Ministry's stoker-demonstrators is arranged, so that the necessary training and instruction on correct methods of firing and plant operation may be carried out in the boiler house. The advice and recommendations also cover such things as remedying plant defects and flue cleaning. If the Ministry are satisfied that a change in fuel is essential, steps are taken to provide a more suitable grade. As a result of this co-operation, we have secured improved conditions in all cases dealt with on the lines indicated.

Smoke Inspector's Certificate

"The normal training of sanitary inspectors includes methods of dealing with atmospheric pollution, and a number have taken sufficient interest in this work to qualify for the Smoke Inspector's Certificate of the Royal Sanitary Institute. The total so qualified is disappointing, but the reason is not altogether obscure. Some local authorities have failed to show adequate recognition of—and the need for—this additional qualification. It is clear that interest in promoting a clean atmo-

sphere is quickened where local authorities and their officers make it a subject for close study."

Discussing future forms of smoke control—prior approval and smokeless zones, etc.—Mr. Redstone said: "Any movement towards a cleaner atmosphere will demand a review and strengthening of present public health staffs, many of which will probably be too small—and not fully qualified—to deal with all the implications of new legislation.

"This suggested basis for a comprehensive code of 'smoke control' will involve questions of organization, both of the inspectorate and of the administration, which to some extent will inevitably be linked with local government reform. It has been put forward by some that a 'National Smoke Inspectorate' is needed. Many are of the opinion that national control would be too isolated, and it is felt that better administration would be set up at Regional Committee level. A Central Control would perform much useful work in disseminating information and advice on policy and technical developments, leaving the Regional Committees responsible for their practical application."

G. Eric S. Sheldon

The second paper at the S.I.A. conference was by Eric Sheldon of Bilston on "Atmospheric Pollution—Practical Experience and Methods of Measurement." It is difficult to quote from this paper, which is an account of the important detailed survey of pollution carried out in Bilston as part of a more general civic survey. The methods used were then novel and behind the account of the work can be seen much of the difficult experimenting that is inevitable in such pioneering enterprise. Forty petri dishes at quarter mile distances were used, with 13 lead peroxide gauges, a deposit gauge and a volumetric sulphur dioxide recorder with smoke filter. The result can best be appreciated by reference to the diagrams showing the "contours" of equal deposit, and reference may be made to an article by Mr. Sheldon that

appeared in *SMOKELESS AIR* for Summer, 1945 (No. 58).

In the present paper Mr. Sheldon says: "The results of my efforts have been submitted to my Council, and I can definitely state that, with the assistance of my Chairman, whose interest in my work never fails, the report received careful consideration. Whilst the findings and conclusions in that report were not entirely welcomed, particularly with regard to the domestic contributions to the total pollution, it was decided that some action was necessary if further domestic smoke was not to be added with the building of the 4,000 houses required to meet the housing needs of the town.

"Discussion centred round the advisability of the use of electrical installations and district heating as against the traditional form of open fires.

"With the assistance of the late Professor Sir Charles Reilly, who was replanning Bilston, a compromise was reached, whereby all forms of heating were to be tried. In houses where open fires were to be fitted they should be coke-burning grates. Plans for a whole scheme on the Reilly-Green layout with district heating have failed due to the inability of the Corporation to gain the approval of the Minister of Health.

"Other difficulties have had to be overcome in the acquiring of grates, but progress is being made and coke-burning grates are being fitted."

We are particularly grateful to the author for the conclusion of his paper: "Finally, a personal appeal to you all. A resolution was passed at the last conference of the National Smoke Abatement Society requesting that 'steps should be taken to undertake a nation-wide survey of the sources and incidence of existing atmospheric pollution and that local authorities be urged to co-operate.'

"I sincerely commend this resolution to you. The benefits that will accrue from such a survey will not only be of national value, but, more important, every local authority will be in possession of information that will enable them to study their own problem with a view to individual effort, as well as

concerted action, in eventually making the air of this fair land of ours fit to breathe."

G. A. Hiller

"A clean Atmosphere" was the title of a paper at the Harrogate conference of the Royal Sanitary Institute, May 1948, by G. A. Hiller, Chief Sanitary Inspector of Bolton. Passages—unfortunately isolated from the general context—are quoted :

"The man in the street points to the mills and factories, the industrialist consoles himself with his production achievements, and is fortified by statistics relating to the smoke emitted from the homes of the people. Sanitarians know that the air we breathe is polluted from both these sources, and until the problem is dealt with as a whole, and it is realized that smoke knows no parish or city boundaries, no substantial improvement will be effected. No widespread effort has yet been made to bring home to the general public the ways in which so many can help to preserve a clean atmosphere.

Opportunities of the Future

"The means now becoming available for a major attack on the scourge of atmospheric pollution are so numerous as to be almost confusing, and there is a very real danger of each sectional interest becoming so completely absorbed in itself that its efforts will be limited to improvements dictated by its own requirements and outlook. The co-ordination of all the various bodies under the guidance of a central council would enable each to view its own approach in true perspective and to see what others are contributing to the same cause. I believe that the setting up of such a central body under the chairmanship of some eminent personage nominated by the Minister of Health would receive the support of all the bodies concerned, quite apart from giving renewed hope and encouragement to those who have toiled for an improved atmosphere for so many years.

National Fuel Policy

"Whilst the Government has brought about the nationalization of the mines and electricity undertakings, and is committed to similar action in respect of gas undertakings, there remains one fundamental point which, as far as I am aware, has not yet been the subject of any official pronouncement. I refer to the absolute necessity of a national fuel policy; once this is formulated, such measures as the carbonization of all bituminous fuel might be embarked upon, and ultimately the generation of electricity might even become possible by means which will overcome the problems of grit and sulphur emissions.

Ministry of Health

"The Ministry of Health can do much by promoting legislation which will provide for our needs as regards district heating, smokeless zones, the prior approval of boiler plant and registration of firemen. At the present time, such of these matters as are enforceable by law are restricted to those local authorities having not only the vision to see the advantages of such powers, but also the financial resources to obtain them. The efforts of these few will, therefore, be of little avail and no major progress will be made until such matters are dealt with on a national level.

"An extensive publicity campaign should also be developed through the press, the cinema and the radio, with the object of driving home the evils of smoke and stressing the extent to which domestic coal burning contributes to the nuisance.

"Further, the Ministry of Health should endeavour to secure a working arrangement with the Ministry of Fuel and Power for the co-operation of their engineers with the officers of local authorities in appropriate cases."

Readers are referred to the Journal of the Royal Sanitary Institute (July, 1948, 68, 266-275) for the full record of the paper and of the interesting discussion that followed, in which several well-known members of the Society participated.

Domestic Heating Research

New Calorimeter Building at the Fuel Research Station

THERE has recently been erected at the Fuel Research Station of the Department of Scientific and Industrial Research a new laboratory for domestic heating research. It is designed to provide full information relating to the heat output and smoke emission from the various types of appliances.

The laboratory is a four-storey building, which occupies a ground area of about 3,000 square feet. It contains four large chambers in each of which the temperature conditions can be accurately controlled. A calorimeter cabinet 12 ft. square by 9 ft. high is mounted centrally in each of these chambers. The calorimeter cabinets are constructed of plywood clad on each side with copper sheeting. This construction was selected after careful consideration of the thermal and mechanical properties of a number of alternative materials. A system of differential thermocouples connected between the inner and outer surfaces of the copper-clad plywood enables the heat flowing out through the walls, floor and ceiling to be measured. Appliances for test can be mounted on a grating floor in the calorimeter cabinets and connected to a chimney outlet in the ceiling. In two of the cabinets the chimneys are placed centrally for testing freestanding appliances and in the other two cabinets they are placed near a wall for testing inset appliances. Air is supplied to each cabinet through a measuring and pressure-balancing system, which provides an unrestricted supply of air and automatically records its volume. The temperature of the air as it enters and leaves the cabinets can also be recorded. Facilities are provided for measuring the amount of hot water obtained from appliances fitted

with boilers. It is possible by the various measuring arrangements to determine the total amount of heat emitted from most types of appliance more accurately, and in more detail, than has hitherto been possible.

The chimneys from the calorimeter cabinets pass through rooms on the top floor where equipment is provided for sampling and measuring the smoke. The amount of smoke emitted from the fire is recorded continuously by passing a beam light through the flue and receiving it on to a photo-electric cell directly opposite. A second set of apparatus using a beam of light which passes obliquely through the chimney has also been provided on each of the four chimneys for measuring the less dense smokes. The beams of light



Entrance to one of the Calorimeter Cabinets



The Control Room

enter and leave the chimney through windows which are heated so as to keep their surfaces clean. Constant-voltage electric supplies are essential both for the source of light and for the

are being equipped.

The construction of these four calorimeter cabinets represents a big advance in the technique of domestic appliance research.

photo-electric amplifier; special stabilising equipment is used for this purpose.

Samples of smoke can be withdrawn from the chimney and their weight determined for calibrating the photo-cell apparatus. The chimneys are lined with stainless steel so that they can be swept without contaminating the sweepings.

One of the four calorimeter cabinets has been completely equipped and its performance is now being studied. The other three calorimeter cabinets

Smokeless Combustion of Low-Grade Fuel

On Tuesday, April 27th, by the courtesy of the London Co-operative Society, members of the Executive Council of the National Smoke Abatement Society visited the Co-operative Laundry at Romford, Essex, to inspect two Cochran "Sinuflo" boilers fitted with Hodgkinson coking stokers, burning out-crop slack of calorific value of about 9,000 B.Th.U. per lb.

In the Hodgkinson stoker, the coal is fed from the hopper by a ram—the stroke of which is adjustable to determine the rate of feed—on to the top coking plate, from which it is eventually pushed by the next charge on to the bottom coking plate where it is agglutinated and partly coked. The gases discharged pass over the incandescent fuel bed and are completely consumed. The coked fuel passes from the lower coking plate to the firebars that are in constant motion, alternate bars moving

together towards the front and all moving together towards the back of the furnace, whereby the clinker formation is broken up and finally allowed to fall over the rear end of the firebars. The ashes are removed at intervals by disengaging the clutch driving the camshaft operating the firebars and lifting a pivoted plate in the flue beneath.

When the boilers were inspected they were not quite on full load. The combustion space temperature was about 675 deg. C., but on full load it is understood rises to some 900 deg. C. No visible smoke whatever was emitted from the chimneys, and the ashes removed showed that the fuel had been completely consumed.

The plant, which had been in use for nine years, was a convincing demonstration of the very efficient use of an inferior fuel.

A.J.C.

The Thames-side Cement Dust Nuisance

Commons Discussion

MR. L. J. SOLLEY, member for Thurrock, raised the question of cement dust on the motion for the adjournment on 29th April. He referred to the considerable number of cement works in Thurrock, on the north side of the river, and in Kent. During manufacture, he pointed out, large quantities of finely ground solids entered the kilns and the chimney gases were heavily laden with dust particles usually, if not scientifically, described as cement dust.

"About 65 tons of it are deposited per square mile of the area in question every month of the year," continued Mr. Solley. "When the wind is blowing from south to north, the cement dust produced by the Kent works find their deposit on Essex soil, and when the wind is blowing from north to south the Thurrock works find their deposit on Kent soil. This figure of 65 tons per square mile per month is three times larger than the average pollution of the atmosphere in ordinary industrial areas.

"The effect of the cement dust in the domestic domain is extremely serious. If windows are opened within a mile of these works, furniture inside the rooms becomes quickly covered with a fine layer of dust. Clothes which are kept on the line become covered. A few weeks ago I had a letter from one of my constituents, a lady who said she could not hang the children's 'nappies' on the clothes line because they soon became covered with a layer of dust. The houses and trees next to these factories are smeared with cement dust. One can almost see a 'white Christmas' in midsummer. The effect of these conditions on the health of persons living in the area is a matter on which medical opinion cannot speak

with direct authority. Subject to this, there is no doubt that a considerable amount of anxiety and worry is engendered in the minds of housewives who have to fight valiantly against these extraordinary and difficult conditions."

Mr. Solley went on to discuss the methods of preventing the nuisance, the most efficient being by electrostatic precipitation. Before the war some progress had been made in equipping plant with precipitators, but many kilns were still not equipped. There was then no excuse about the shortage of steel, and the only real excuse for the industry except "they were too stingy to spend money to safeguard the public from this nuisance." To-day the companies have suddenly decided to do everything they can to remedy the nuisance. "But," went on Mr. Solley, "there is a snag in this apparent readiness; they put the blame on the Government and say they cannot get the necessary steel. It is interesting to note that they should have waited until there was a Labour Government and they could make these excuses, when before the war they could have remedied the nuisance."

Urging the Government to allocate the steel required for the electrostatic precipitators, Mr. Solley said: "I know that the Minister will say that we must have regard to the shortage of steel and to the necessity of increasing production in the interest of the export drive, but I would say to him that, as far as this nuisance is concerned, I am confident, in the light of my researches and with such knowledge of the law as I possess, that the cement companies are guilty of a public nuisance. I am confident that any of the local authorities concerned could take civil proceed-

ings in order to counteract this nuisance, and, in this connection, it is interesting to note that His Majesty's judges have ruled that it is no defence to a charge of this nature to say that the nuisance arises from the carrying on of a trade beneficial to the community, and that the nuisance is less than the advantage from the trade."

Mr. Solley was supported by Mr. N. Dodds, member for Dartford, who spoke on behalf of the Kent areas affected. He mentioned the investigating committee that had been formed of representatives of the local authorities. "They have met representatives of the cement works in the Dartford district, and they were specifically informed that the policy of the cement works was to control this dust nuisance but that this has been seriously interfered with because they cannot get the machinery necessary for the task. . . . We look to the Parliamentary Secretary to inform his right hon. friend that, so far as the social work and the great activities of the Ministry are concerned, they can have little effect in Kent unless this dust is dealt with."

The Reply

The Parliamentary Secretary to the Ministry of Health, Mr. John Edwards, replied. He did not want it to be thought that there was any evidence to support the view that cement chimney dust caused a direct danger to health. This did not mean, though, that it was not annoying in a hundred and one ways, but he did not want them to be alarmist about it. It was not possible to let up in production because of the terrific need we had of cement both at home and overseas.

Mr. Edwards continued: "The law relating to cement works says that the owner shall use all practicable means of preventing the escape of fumes, and these words have reference not only to the erection and maintenance of appliances but also to the proper supervision and use of them. Cement works have to be registered with my Ministry, but it is only since 1936 that such works were added to the schedule of the Alkali Acts, and since then new works have had to have the best appliances

from the start, and existing works have had to provide such appliances. We have special inspectors in the Department concerned with all the works under the Alkali Orders, and they are in the closest touch with all the firms. . . .

"I would like to say, in justice and fairness, that in our experience the managers of the cement undertakings in this area are willing to co-operate not only in the field where we have statutory control, the high level emission of dust, but in the field of low-level emission of dust where we have not powers at all. I do not think that, in fact, from the time we had statutory powers, their record is open to very much criticism. After the cement works were put under this order in this area, that is, from 1936 to the outbreak of war, we got 18 electrical precipitation appliances in operation. In those days plants cost something like £30,000 or £40,000, and over that period, although things were not wholly satisfactory, there was considerable progress. But for the war we should, by the exercise of our powers, have got the Thames-side cement industry into the right position in relation to prevention plants. The war knocked that on the head, and there is quite a genuine difficulty at present in getting delivery of the plant. . . .

"Especially in the light of what I have heard to-night, I will certainly do all I can to push forward the production of precipitation plants, but I would not want to mislead anyone on that point, because the allocation of steel is so limited that what it might be open to me to do is also limited, and until we get an improvement in the steel position I am not very hopeful of our being able to do anything very rapidly. . . ."

"I can assure hon. Members that we shall, through our alkali inspectors, do what we can to get a move on here, but I would say that our major difficulties are in the supply of steel, and not difficulties at the present time on the part of any of the cement firms. . . . I have taken note of all that has been said in this discussion, and shall take a further opportunity of going into the matter with my advisers."

Smoke Control by Prior Approval

How Sound is the Case?

IN this country, until quite recently, the only means for enforcing smoke abatement has been by what can be called stable-door legislation. That is, the creation of all the conditions for smoke emission was permitted without check or hindrance, and only after a nuisance has been committed could action be taken. All efforts to improve the legislation had been within the narrow framework of the 1875 Public Health Act, despite the accumulating evidence from other countries of the value of what has come to be called prior approval.

At last, however, as a result of the efforts of the Society, this principle has gained a foothold in England, and in one form or another has been incorporated in recent local legislation—the City of London (General Powers) Act, 1946, the Manchester Corporation Act, 1946, the Preston Corporation Act, 1947, and, less directly, in the form of powers to establish smokeless zones in the Coventry Corporation Bill. Salford is also promoting a Bill with prior approval powers.

Such local Acts are of considerable value in advancing new principles of legislation. They are likely to vary and may even be inconsistent with each other. But from them, by experience and comparison, can emerge a sounder and more readily acceptable formula for the next step—general national legislation. Too much concern over the possible shortcomings and anomalies in the new local Acts should not, therefore, be felt. The position is that at the moment we are moving—groping is perhaps too strong a word—in our pragmatic British way towards a very important principle in the field of smoke prevention, and considering that it began only six years ago progress so far is most satisfactory.

The main divergence in the new Acts may be indicated by comparing Man-

chester's with Preston's. In the former it is laid down that no furnace shall be installed unless "it is so far as practicable capable of being operated continuously without emitting smoke." To allow the person concerned to learn whether his proposed installation comes within this requirement the next clause states in effect that he *may* submit his plans for "prior approval" by the Corporation. He need not do so, but if the result is a smoke-producing furnace the preceding clause may be invoked against him. The Preston Act, on the other hand, makes it obligatory for the plans of *all* new installations to be submitted for approval. Both the Preston Act and the Salford Bill have in addition a clause that states that if a proposal is disapproved, the Corporation will discuss the case with the Ministry of Fuel and Power. This perhaps reflects some anxiety on the part of the Ministry about the way the new legislation is developing, and it is again an indication of the way in which all points of view are coming together to create the pattern, still far from final, of the future general law.

Points Against Prior Approval

There is naturally some criticism of either the principle itself or of the way it is proposed to apply it. The more important of these criticisms may be summed up as follows:

(1) That the principle itself is wrong. The question of what fuel-burning equipment is installed is a matter for the maker of the equipment and his customer only. This point of view has been advanced by the Society of Furnace Builders, which declares that "smoke abatement is already a primary aim in the design of modern furnaces," and that "the furnace builder and the furnace user are the only parties competent to decide on the proper type of furnace to be installed."

(2) That the principle may be sound, but that it cannot be applied by local

authorities. Prior approval needs qualified technical staff, who are, moreover, not subject to local influence. Many local authorities, and certainly all the small ones, cannot afford the requisite staff, and even if they could there would not, in the lightly industrialized areas, be sufficient work for them to do.

In any case, the scheme must overlap with the work of the regional Fuel Efficiency activities of the Ministry of Fuel and Power. It is also necessary to have uniform standards throughout the country to avoid anomalies and confusion. The scheme should be integrated with the general work for fuel efficiency and should be operated on a national basis by the Ministry of Fuel and Power.

And the Answers

To these objections the supporters of prior approval make replies on lines that may be summed up as follows :

(1) It can be agreed that furnace design is improving and it may even be that before long every *new* furnace, if properly installed, fully equipped, always operated and maintained at maximum efficiency, never overloaded, and never used for purposes for which it was not primarily intended, would be smokeless. But it is extremely doubtful whether these conditions could always be assured without some degree of external control or supervision. It is not only a question of the furnace alone, but of the installation as a whole, its operation and its maintenance, that has to be considered. And surely there is a third party to be taken into account—the community in general. When we consider the atmosphere as it is to-day the claim that fuel-burning plant concerns only the maker and the user is not exactly conclusive.

It is odd, too, that there should be such fears among the furnace-makers in view of the fact that in the United States, so firmly wedded to untrammelled enterprise, prior approval is accepted without demur by all sides, and indeed seems to be welcomed as an aid to the industrial interests.

(2) Most, perhaps all, advocates of prior approval will accept the view that

it cannot be operated independently by every local authority. But the choice is not between local and national: there is also the intermediate stage of regional administration. A large city can set up an organization adequate for smoke prevention—it has already been done in a hundred or more American cities—and a group of small authorities can set up an equivalent joint organization that can give efficient technical administration plus continuity of local or district knowledge.

Whether such statutory regional committees are preferable to the regional units of a central organization for prior approval purposes may perhaps be argued further, and maybe if prior approval were all there would be little in it either way. But the point that is usually overlooked is that prior approval is not all we need in the future for smoke prevention, and some of the other measures—smokeless zones, control by licensing of the fuel used, and the continued exercise of responsibility under the existing Public Health Acts—must to a large extent continue to be the concern of the local or regional authority; or perhaps of the new town-planning authorities.

Therefore, continues this argument, local authorities, singly if they are large, or in association if they are small, can administer the new principle of smoke prevention. Uniformity of standards and methods could be ensured by a central advisory or supervisory body, which in its turn could be linked with the Ministries concerned. And regionally, it would be agreed, there should be close liaison with the Ministry of Fuel and Power organization and the Alkali Inspectorate.

Finally, say the prior approval protagonists, the fact that the principle does work smoothly and well is shown not only by examples from the U.S.A., Canada, India, and elsewhere, but at last in our own country. Where it is being operated in Britain, even under restricted conditions or in a more or less voluntary fashion, it is going well, and evidence will be given in some of the "Progress Reports" at Cheltenham.

Smoke Prevention Abstracts

Acknowledgments are made, where required, to the Abstract sources indicated

86. Atmospheric Pollution and the Deposit Gauge, Ashworth, J. R. (Weather, May, 1948, 3). The author criticizes the standard deposit gauge on account of variations due to wind action, etc., and suggests that useful information is obtainable with a covered revolving gauge with elbow tube and vane to keep the tube facing the wind. Comparative figures of tests with revolving and standard gauges are given. It is suggested that a more trustworthy instrument, after the type of the revolving gauge, could be devised and perhaps used in conjunction with the standard gauge. The article is followed by notes by Meetham, A. R. and a comment on these notes by Ashworth. Letters by Coste, J. H. and Ashworth appear in June, 1948 issue of the same journal.

87. Importance of Particles, Berkovitch, I. (Discovery, May, 1948, 9). The author surveys in outline the problems caused by dust when air borne and when used in industry, and reviews methods for its removal by means of baffles, filters, cyclones, washers and electrical precipitators.

88. Smoke Abatement and the Gas Industry, Roberts, J. (Coke, Dec., 1947, 9, 383-384). The author surveys papers presented at the 14th annual conference of the National Smoke Abatement Society. He defends the carbonizing industry which is doing more than any other industry in helping to rid the atmosphere of smoke, and discusses its policy in modifying coke properties so that it may be used in both new and old-type grates. More than twice as much coal is required to provide heat via the generating station as compared with coal processing at a gasworks. A plea is made for the retention of the open smokeless fuel fire. (Fuel Abstr.)

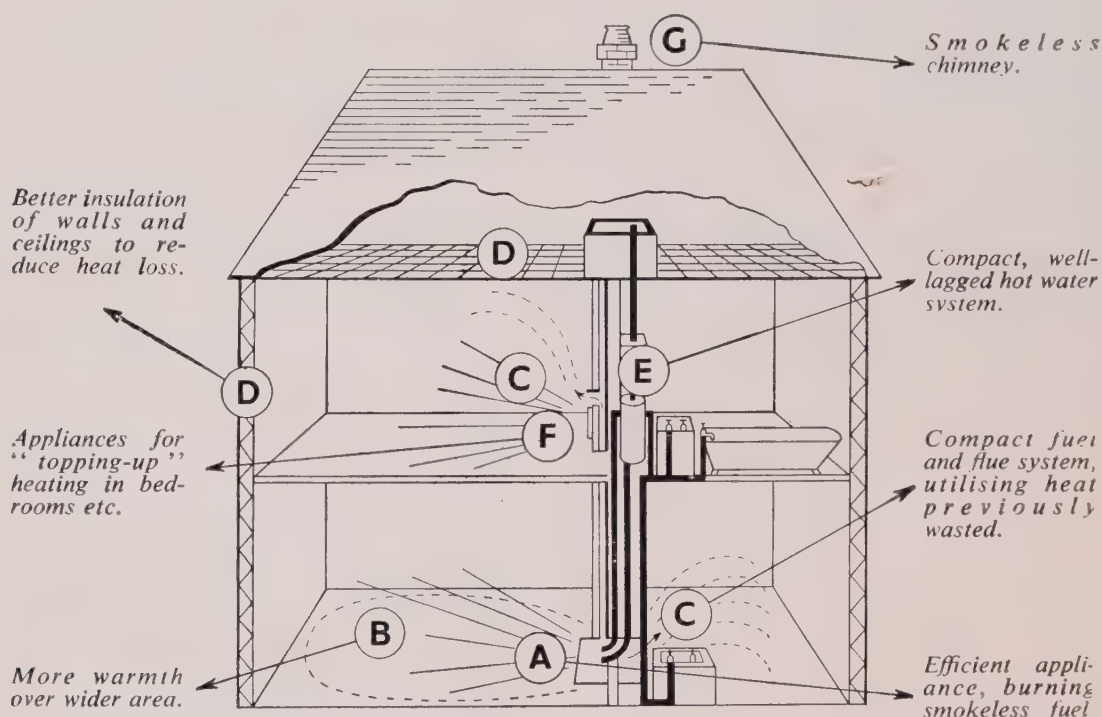
89. Dust-fall Sampling Method, E. M. Mabuice (Union Elec. Co., St.

Louis, Mo.) (Proc. Smoke Prevention Asso. America, 1947, 99-103). For making relative measurements of dust fall, the methods using a funnel or sampling jar are time-consuming and subject to serious errors. A more convenient method was the exposure of a transparent film of cellulose acetate with an adhesive on one side (available commercially). The exposed area was 5 x 6 in. and was held horizontally on electric distribution poles 14 feet above ground. After use, the exposed area was covered with a similar strip to seal in the dust. The deposits were compared by photoelectric means; the comparator was calibrated by detn. of dust weight. A continuous dust recorder was also developed, based on the use of a funnel (with vibrator) depositing the dust on a roll of cellulose tape; after use this was covered with a layer of similar tape. The results were used to study the effect of wind direction on dust fall, especially as regards elec. generating stations. (R. W. Ryan, Chem. Abstr., U.S.A.).

90. Use of Fog Dispersal Systems: Possible Application to Railways (Bull. Doc. Tech.S.N.C.F. (Soc.Nat. Chemins de Fer), Apr., 1947, 4, 86-88). The disorganization of work in shunting yards during periods of fog, and the delays caused thereby, would be alleviated by the use of a fog dispersal system. It is stated that two British railway companies have interested themselves in the matter. The article describes the F.I.D.O. system used at airports and the American "Go Fog" equipment by which fog dispersal is caused by the projection into air of calcium chloride. Other dispersal methods under trial are a "water screen" method, and in America a mechanism which brings about by vibration the agglutination of fog particles which become too heavy to stay in suspension.

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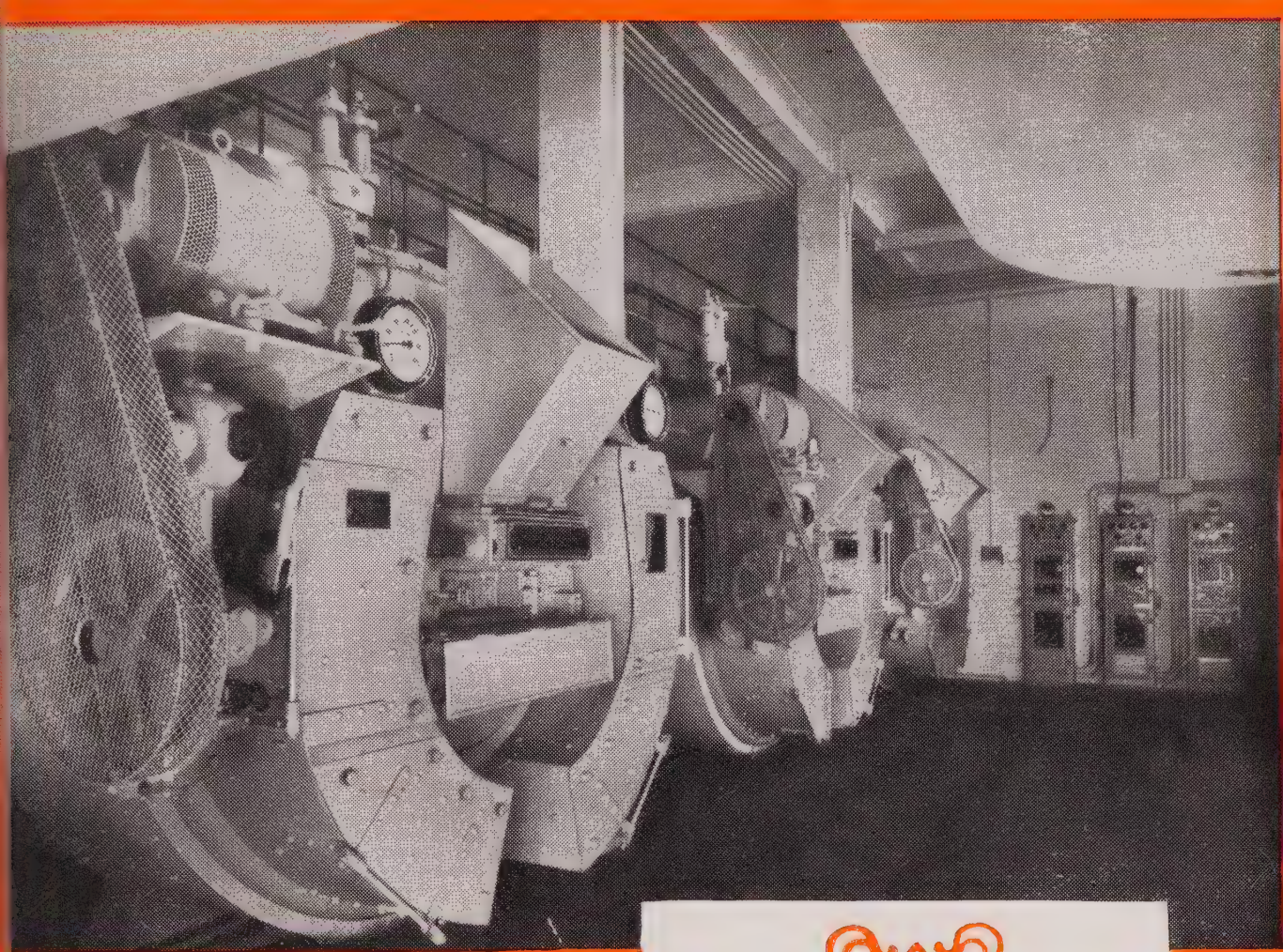


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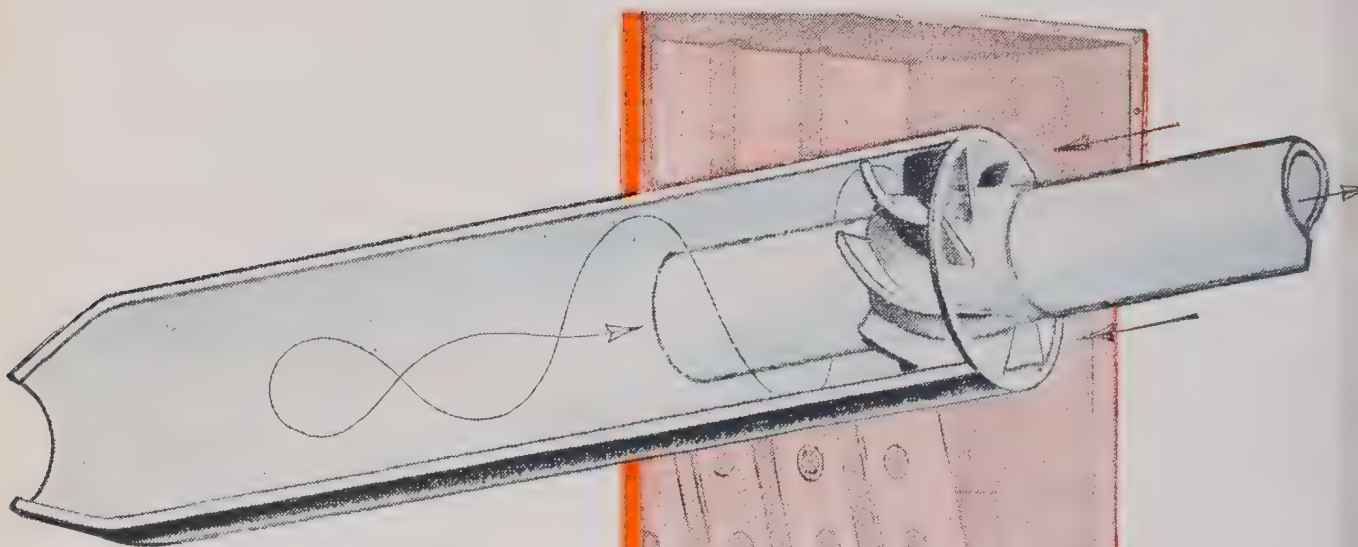
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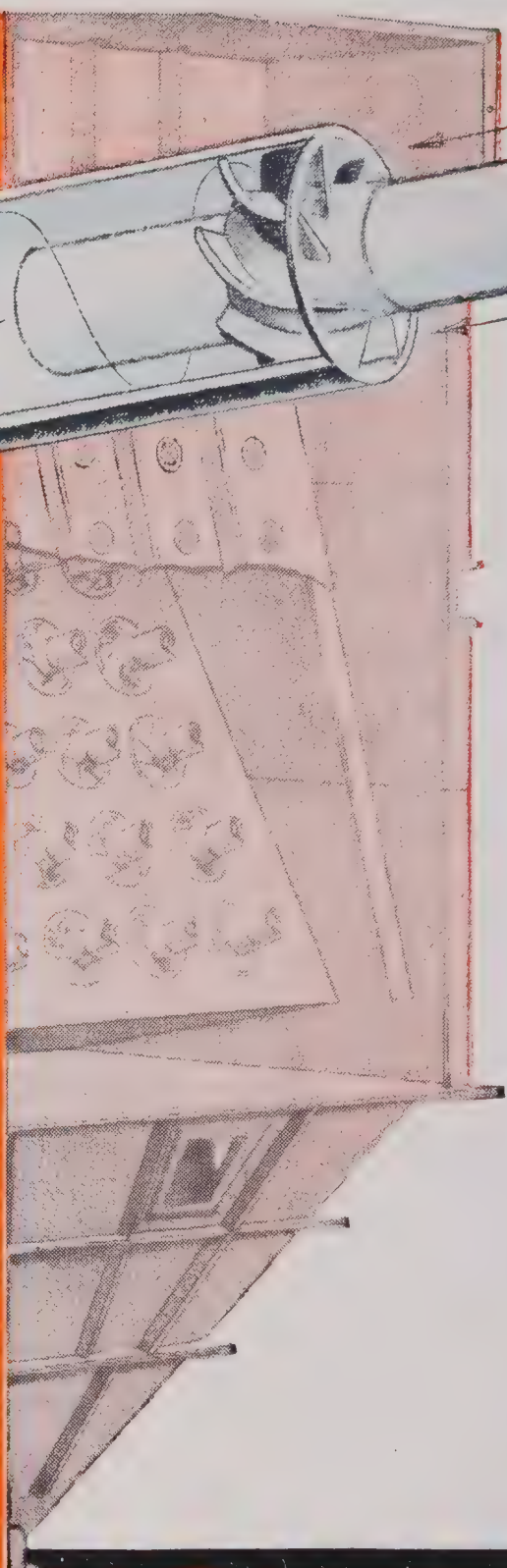


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SMOKELESS AIR

THE SMOKE ABATEMENT JOURNAL



No. 68 AUTUMN-WINTER · 1948

ONE SHILLING

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These girls shivered in their shoes, but . . .



the gardener's crops grew hot and strong!

The frost never caught old Giles' superb runner beans outside the main workshop windows, but the feet and fingers of the girls working *inside* got well and truly nipped. So the welfare-minded management sent for the Ministry's Regional Fuel Engineer.

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To-day the pipe is lagged for its whole length, the girls are warm and happy, output is soaring and gardener Giles is wondering

how he can get soil-heating for his precious crops!

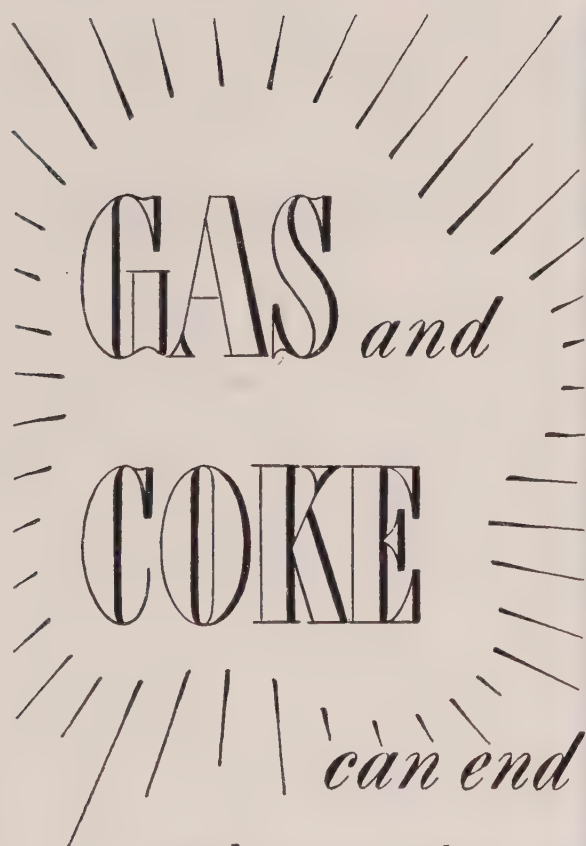
This case was perhaps typical of many wasteful practices that are still costing the nation thousands of tons of coal a year. All too often 'out of sight' means 'out of mind', and the leak of hard-won fuel continues year after year, unchallenged and unchecked.

You are a go-ahead type, of course, so your Fuel Efficiency is naturally of a high standard—but could there be *anything* you've overlooked? There's one way of making sure—ask the Ministry's Regional Fuel Engineer to visit you. His advice *may* be worth its weight in gold and his services are FREE.

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North-Eastern	Mount Pleasant School, Sharrow Lane, Sheffield	Sheffield 52461
North-Midland	Castle Gate House, Castle Gate, Nottingham	Nottingham 46216
Eastern	Shaftesbury Road, Brooklands Avenue, Cambridge	Cambridge 56268
London	Mill House, 87-89, Shaftesbury Avenue, W.1	Gerrard 9700
South-Eastern	Forest Road, Hawkenbury, Tunbridge Wells, Kent	Tun. Wells 2780
Southern	Whiteknights, Earley, Reading	Reading 61491
Wales	27, Newport Road, Cardiff	Cardiff 9234
South-Western	12-14, Apsley Road, Clifton, Bristol, 8	Bristol 38223
Midland	Temporary Office Buildings, Hagley Road West, Birmingham, 17	Bearwood 3071
North-Western	Burton Road, West Didsbury, Manchester, 20	Didsbury 5180-4
Scotland	145, St. Vincent Street, Glasgow, C.2	Glasgow City 7636
Scotland	51, Cockburn Street, Edinburgh, 1	Edinburgh 34881
Scotland	1, Overgate, Dundee	Dundee 2179

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SMOKE

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3. *National fuel economy.*
4. *Smoke abatement.*

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(Sir John Cockcroft, C.B.E., F.R.S. Director of Atomic Energy Research at Harwell).

- 2** “I do not think anyone will be rash enough to prophesy what discoveries of real industrial importance will result from the researches now in progress ; but I shall certainly assert that the production of power from uranium cannot bring such economic benefits to Britain within twenty years *as would the practical application of known methods of economising coal.*”
(Sir Henry Tizard, K.C.B., F.R.S. President of the British Association for the Advance of Science).

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Arnold Marsh, M.Sc.Tech., M.Inst.F.

OFFICIAL NOTICES TO MEMBERS

Annual Elections

Following are the results of the Elections announced at the Annual General Meeting held in Cheltenham on September 29th.

President: The Rt. Hon. Lord Simon of Wythenshawe, LL.D. (only nomination).

Hon. Treasurer: Sir Ernest Smith, C.B.E. (only nomination).

Vice-Presidents: All the retiring Vice-Presidents were re-elected, and in addition Alderman G. E. Beavon, C.C. (Chairman, Midlands Joint Advisory Council for the Abatement of Smoke and Atmospheric Pollution) was nominated and elected.

Executive Council. Scottish Division: Allan W. Ritchie, John Innes, Bailie V. Robertson; *North West Division:* Charles Gandy, Dr. J. L. Burn, Dr. Metcalfe Brown, S. N. Duguid, Professor F. E. Tylecote, Dr. J. S. G. Burnett, W. L. Mather; *North East Division:* Alderman P. Hancock, Councillor W. H. Bainbridge; *Yorkshire Division:* John W. Beaumont, James Goodfellow, James Law, Dr. I. G. Davies; *West Midlands Division:* G. W. Farquharson, C. A. Stansbury, Dr. W. R. Martine; *East Midlands Division:* Alfred Wade, F. G. McHugh; *South West Division:* F. J. Redstone,

F. R. Jefford, Councillor R. Francis; *South East Division:* Dr. R. Lessing, N. Bastable, S. Swift, G. Nonhebel, Dr. A. J. Shinnie, H. G. Clinch, L. A. Stroud, H. L. Snowden, R. A. Baskett, W. Tillcock.

New Publications

Proceedings of the Cheltenham Conference. The complete record of the conference, including the addresses by the President and the Minister of Fuel and Power, all Papers, and a report of the Brains Trust Session. 3s. 6d.; by post, 3s. 8d.

Address by the Minister of Fuel and Power, the Rt. Hon. Hugh Gaitskell, M.P., to the Cheltenham Conference. 6d.; by post, 7d.

Interim Report on the National Survey of Pollution, by A. J. Cousin. Reprinted from the Cheltenham Conference Proceedings. 1s.; by post 1s. 1d.

Smoke Abolition and the Public: Problems of Education and Propaganda, by Leslie Hardern. Reprinted from the Cheltenham Conference Proceedings. 6d.; by post, 7d.

Smoke Prevention in Relation to Town Planning, by J. Nelson Meredith. Reprinted from the Cheltenham Conference Proceedings. 6d.; by post, 7d.

Guilty Chimneys. The evidence of authorities against smoke. With photographs and a four page inset of maps and diagrams in colour. 1s. 0d.; by post, 1s. 2d.

Full members of the Society, and appointed representatives of full members may, *on request*, obtain copies of these new publications free of charge.

SMOKELESS AIR. Vol. XIX, No. 68, Autumn-Winter, 1948. Published quarterly by the Society at the above address (editorial and advertising).

Gratis to members and representatives of members. Subscription rate: 2s. 6d. per annum, post free.

Smokeless Air is the official organ of the Society, but the views expressed in contributed articles are not necessarily endorsed by the Society. Abstraction and quotation of matter are permitted, except where stated, provided the usual acknowledgements, including the name and address of the Society, are made.

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Open unto the fields, and to the sky;
All bright and glittering in the smokeless air.*

SMOKELESS AIR

An Important Advance

FOR some years the Society has been pressing for the first essential step towards the abolition of domestic smoke: to ensure, that is, that in all new houses the only solid fuel burning appliances to be allowed should be of the new, more efficient, multi-fuel types. Not only would this give immediate fuel savings and less smoke even where bituminous coal is used, but it would make possible at any time and without alterations the use of smokeless fuels. This policy was also recommended by the Fuel and Power Advisory Council in its Domestic Fuel Policy Report, and was quite recently urged once more in a resolution passed at the Cheltenham conference of the Society.

It is therefore most gratifying that, as far as local authority houses are concerned, this step has now been

taken, and we should like to thank the Ministry of Health for their action. This is stated in their circular to Housing Authorities, number 170/48, dated November 11th, 1948, the operative paragraph of which reads thus:

“Having regard to the continued importance of economy in fuel and the permanent need of cheaper and more efficient domestic heating, the Minister must in these circumstances ask all housing authorities to review present practice and in all future housing schemes to specify only the types of solid fuel heater contained in the lists of improved appliances circulated from time to time.”

The Councils are requested to confirm, when submitting housing proposals, that they are specifying these types of appliances. In case of any

difficulty the local authority should make its doubts known to the Principal Housing Officer of the Ministry, "who will, the Minister is confident, be able in consultation with the Regional Officer of the Ministry of Fuel and Power, to remove them."

Similar action is being taken by the Secretary of State for Scotland, and, in a reply to a question in the House of Commons, the Minister of Health stated that the position with respect to new houses built privately was being considered.

It will take some time for the benefits accruing from this step to be apparent (except to the families living in the new houses), and it will take a still longer time before measures can be taken to ensure that nothing but smokeless fuel is used in the houses equipped with the improved appliances. But this in no way detracts from the radical significance of the advance. *The Times* leading article, a reprint of which is enclosed for the information of our readers, does not overstate the fundamental position in its opening paragraph. For the first time in this country the community is, for its own sake, exercising control over the hearth of the individual. A new principle has been accepted and is being enforced. The further advances we seek will be no more than extensions of this principle.

These further advances include the need to ensure that replacements of equipment in existing houses shall be restricted to the improved appliances, and after that a beginning on the great but necessary task of replacing obsolete appliances in all existing houses. For the saving of fuel it does not matter where this is done, so long as it is done, but from our own point of view it is desirable to concentrate first of all on the areas where there will be most benefit from smoke prevention—a need that can best be attained through our policy of expanding smokeless zones.

The other aspect of the question is the provision of solid smokeless fuels for the improved appliances. The prospects of an early big expansion of supply are not easy to assess, but we hope to discuss them afresh and in some

detail in a later issue.

The Minister at Cheltenham

The address to the Society's conference of the Minister of Fuel and Power is printed in full in the *Proceedings* of the conference, and has also been published as a separate reprint. It is not therefore recorded in these pages, but we urge all members who have not already done so to ask for a copy. They will read, as the conference was delighted to hear, an outstandingly thoughtful and enlightening paper, to which Mr. Gaitskell must have given a considerable amount of time and reflection. We expected him to refer, as he did most convincingly, to the close relationship of smoke prevention to fuel efficiency, but in addition to this he surveyed the problem as an economist. His main point here was that smoke "constitutes a social cost which is paid for by the whole community, while no bill is sent to the real sinner, who therefore continues to sin with impunity," and that there is a case "for intervention by society, for action by the community, so as at least to impose upon those who are responsible for creating the social costs the responsibility for meeting them."

The Minister re-emphasized this, and even made it more precise, in the fourth of five principles for a long-term fuel policy that he outlined in a later address to the Rotary Club of London. The five points are reported as: (1) the right of the consumer to choose his own fuel; (2) consumers should choose wisely; (3) the price of fuel and appliances should reflect the real costs to the community; (4) costs should include any damage to other persons due to the use of fuel, and (5) there should be co-ordination between the power industries to secure maximum efficiency and the lowest cost.

The inclusion of both (1) and (2) is a little perplexing, but is something we have discussed before. At the moment we would ask our readers to ponder over the implications of (4).

This is a very important point, or, perhaps, principle for action. In

practice it would seem to mean either some kind of tax on those who make smoke, or some form of rebate for those who do not. In various forms the principle has been advanced in the past, and there are clearly many problems to be solved if we are to try to bring it into a working scheme. At the moment the most interesting and heartening thing is that the Minister of Fuel and Power should be thinking on these lines and should, by his address, be encouraging the Society to do the same.

Death in Donora

At Donora, as in the Meuse Valley in 1930, abnormal meteorological conditions have led to such a concentration of fog and atmospheric pollution that the resultant deaths and illness have become world news. In the Meuse Valley were a number of different types of industrial plant, whereas at Donora the principal factor appears to have been a zinc smelting works. In both cases sulphur dioxide appears to have been the principal toxic agent, as of course it is in the mortality that follows severe fog in this country. At Donora the 18 or 19 deaths were all of people between 62 and 75 years old. 400 more were seriously ill and hospital accommodation was strained to the limit. It will be noted that those who succumbed were elderly, and, as would be expected, those who were subject to asthma appear to have been particularly affected. In one case the post-mortem reports "death due to extreme œdema of lungs secondary to hypertrophy of heart. The asthmatic condition from which the patient suffered was due to this disease of the heart."

It is a mistake, however, to consider only the number of deaths. There are the 400 who were so ill that they had to be taken to hospital, and the unnumbered others who were distressed or moderately ill. The recent fogs in this country may or may not have caused such intense concentrations of pollution that the effects will be seen in the mortality tables, but there will be little doubt that they will have given rise to a vast amount of unnecessary

suffering and sickness. This, of course, never hits the headlines. Some of Britain's fogs in the past have been far more serious than either the Meuse Valley or Donora cases—deaths in London in a fog of 1892 were 1,484 in a week—and although the chances are good that we shall not have tragedies on such a scale again, the fact remains that there is still enough sulphur dioxide and other pollutants going into our atmosphere to turn into a catastrophe an always possible freak fog of long duration and intensity.

Although sulphur dioxide, especially when emitted without the soot and tarry material of smoke, can normally disperse freely through the vast spaces of the atmosphere so that its effects are negligible, there must remain the danger of it being contained, with ever-increasing concentration, like water soaking into a sponge, in the still grey shroud that is fog.

Bouquet Acknowledged

It cannot be pretended that it was not gratifying to hear an independent and shrewd observer of our work declare at the Cheltenham conference that of all the organizations he knew "none could be recommended to spend its resources so wisely and to such good purpose as the National Smoke Abatement Society." This tribute to the efficiency with which the affairs of the Society are conducted and its slender income expended should, it is felt, be accepted as a convincing argument for the substantial increases in funds for which we are appealing. We hope, too, that it will be agreed to by our present members—especially when they receive the annual invitation for the kind renewal of their subscriptions!

Harrogate, 1949

The Society has accepted an invitation from the Mayor and Council to hold its 1949 conference in Harrogate. The date, it is anticipated, will be September 28th to 30th. It was at Harrogate in 1928 that the Smoke Abatement League of Great Britain held its last conference before the present Society was formed. The attendance was about 30. Next year we expect that it will be 450.

Pittsburgh Fights Smog

The Story of the New Ordinance

by Arnold E. Reif *

I STILL remember the hot September evening a year ago when I stepped off the train at Pittsburgh's railway station for the first time. The streets were deserted except for the occasional sight of a car headlamp and its cone of light slowly moving through the smoke-fog mixture, Pittsburgh's "smog." The forlorn, gloomy scene was a little depressing—Pittsburgh certainly had not strained itself that night to make me welcome. But, above all, I remember the smell of the air—a tarry, thick smell, the smell of coal tar.

Last month, almost a year later, I arrived back in Pittsburgh early on an August morning after a vacation in England. The morning mist still rested lightly on the streets, but it was a clean, white mist and two hours later the sun had broken through and Pittsburgh lay bathed in sunshine.

By chance, Pittsburgh's weather had greeted me each time with a characteristic gesture. The intervening year had seen an improvement in Pittsburgh's atmosphere out of all proportion to the space of time involved. The citizens of Pittsburgh all agree that the last year has seen a profound change for the better. But for those who have not been here to witness the change there are convincing statistics to prove the success of the present Superintendent of the Bureau of Smoke Prevention, Dr. Sumner B. Ely. Pittsburgh received 39 per cent. more of the available sunshine in the past winter (October 1947 to January 1948 inclusive) than in the same period of the previous year. Naturally, climatic conditions influence the amount of sunshine received. Last winter was colder than the previous winter; although there was less wind velocity



Smog over Pittsburgh

to blow away smoke, there was more turbulence in the air. It has been claimed that Pittsburgh should have had more smoke last winter than in the previous one, had there been no improvement in smoke abatement. Certainly, the very considerable increase in the hours of sunshine Pittsburgh received last winter is an index of the city's success in its smoke abatement programme.

No improvement comes about without well-directed effort. In the case of smoke abatement, there has never been any doubt as to the possibility of attaining the objective; it is simply a question of balance between the harmful effect of smoke and the price the community will pay for its abatement. Many communities, even in our socially-minded age, have never taken the trouble to put "smoke" on one arm of a balance and "cost" on the other. But a single action, a single law, passed

* A member of the Society, from Sheffield, engaged in research at the Coal Research Laboratory, Carnegie Institute of Technology, Pittsburgh.



9.20 a.m. on an Autumn morning

against smoke is not enough. Smoke is a weed grown on industrial soil. A single weeding still leaves the roots in the earth. There is no simple cure; smoke must be steadily weeded and never given a chance to spread. This lesson is best borne out by the chequered career of smoke abatement in the city of Pittsburgh. Many times in its history, public-minded citizens have set to and attempted a thorough weeding. A few years later Pittsburgh was again choked with smoke.

Pittsburgh seems to have been a close second to Sheffield, England, as far as smoke was concerned. Anthony Trollope, who obviously had never set foot in Sheffield, described Pittsburgh as "the blackest place I ever saw." Whereas a Yorkshireman said "where there's muck there's money," the Pittsburgh version went "smoke means prosperity." A hundred years ago doctors held views we should now consider as odd. For instance, the *Pittsburgh Gazette* of August, 1834,

reported 44 deaths from cholera and then proceeded to attribute the good health of its citizens to the coal smoke, clean air and pure water.

Early Legislation

The city fathers first set about dealing with the smoke nuisance back in 1869; the use of bituminous coal or wood in railway locomotives within the city limits was forbidden. There is good evidence to show that no one took this law seriously. However, while the men dawdled, the women took the job into their hands. It was the Ladies' Health Association of Allegheny County which was instrumental in securing Pittsburgh's first civic investigation into smoke abatement in 1892. As a result, the city council passed an ordinance prohibiting smoke nuisance, which was defined as "20 per cent. black smoke" in a new ordinance three years later. As a result of an appeal by one of Pittsburgh's great benefactors, Andrew Carnegie, the Chamber of Commerce took up the battle for clean air in 1898.

Not until nine years had passed was a Smoke abatement Ordinance implemented by the appointment of a Smoke Abatement Inspector. After a legal battle in 1911 the ordinance was declared null and void on the grounds that the laws of Pennsylvania did not give authority to the City of Pittsburgh to pass smoke abatement laws and further, that present laws were unreasonable. Thus, the Smoke Inspector was out of a job and his bureau was disbanded. Six months later he was reinstalled when a new Smoke Ordinance was passed.

During the next two decades, research workers at the Mellon Institute and the Carnegie Institute of Technology helped to make smoke abatement a science. Under H. B. Mellor, Chief of the Bureau of Smoke Prevention, Pittsburgh became a centre for smoke control information. Following the smokeless chimneys of the depression years in the early thirties, smoke abatement again became a vital issue. A state grant in 1936 enabled Dr. Mellor to direct a very thorough Air Pollution survey. Unfortunately, his untimely death prevented the utilization of the results obtained. Despite research and surveys there was still too much smoke, for technical knowledge without adequate legislation or enforcement of that legislation was of no immediate value. Forests of domestic chimneys joined the giant stacks of industry in pouring black smoke into the atmosphere. Finally, early in 1939, the city virtually gave up the fight by abolishing the Bureau of Smoke Prevention for the second time.

At this point in Pittsburgh's history, when the smoke menace had once more gained the upper hand, the United Smoke Council came into being. An offspring of the old-established Civic Club of Allegheny County, it later merged with the newly formed Allegheny Conference on Community Development, a similar non-partisan citizens' organization which enlisted the best talents of industry and the professions with the specific object of planning a development programme for the City of Pittsburgh. It had long

been recognized that smoke control was the key to a brighter Pittsburgh. Now that funds were assured, a propaganda campaign for smoke control was launched. The three local newspapers lent their full support and public pressure was brought to bear on the city's legislative council.

The 1941 Ordinance

Up to this time, Councilman A. L. Wolk had been one of the few city councillors who took an active interest in smoke abatement. By a propitious coincidence, he suddenly became more intensely aware of the need for smoke control. His son had been suffering for some time past from a peculiar type of sinus trouble, which a local doctor analyzed as being a common condition in Pittsburgh, an irritation of nasal passages caused by breathing soot-laden air. Within a short time, Councilman Wolk was the chief exponent of smoke abatement in the city council. In due course, the Mayor appointed a commission for the elimination of smoke, which resulted in a new and drastic smoke prevention ordinance being passed in 1941. This ordinance, except for minor amendments, is still in force at the present time.

The purpose of the ordinance was to provide an integrated plan of smoke control for the City of Pittsburgh, to prevent excessive emission of smoke and the resultant ill effect upon public health and welfare. The ordinance may be summed up under six headings :

1. *Air Pollution* in all its forms became subject to regulation. Emission of smoke, cinders or noxious fumes in greater density than defined by the ordinance became a punishable offence.

2. *Sale of Fuels* became subject to regulations. Coal of high volatile content could legally be burnt only in mechanically-fired equipment. Homes using the hand-fired stoves were required to use smokeless solid fuel, which was defined as coke, or coal with a volatile matter of less than 20 per cent.

3. *Fuel-burning Equipment* other than domestic stoves became subject to an annual inspection and the issue of a certificate of operation. A permit was

required for reconstruction or new installations.

4. *Locomotives* operating within the city limits were required to use smokeless solid fuel if not equipped for mechanical firing.

5. *A Bureau of Smoke Abatement* was set up under the direction of the Superintendent of Smoke Prevention. Its duty was to ensure the enforcement of the ordinance and it was granted power to fine offenders.

6. *An Appeal Board* was appointed to hear and give rulings on complaints regarding the imposition of penalties by the Superintendent of Smoke Prevention.

Whereas Sections 1, 3, 5 and 6 became effective on October 1st, 1941, and Section 4 a year later, war-time conditions warranted a postponement of the far-reaching Section 2. In 1946 it was decided to prohibit the sale of coal of high volatile content for use in hand-fired equipment by October 1st, 1946, to all except domestic consumers. The deadline for homes housing only one or two families was set as October 1st, 1947.

During the intervening four years the Bureau of Smoke Abatement made good use of its opportunity to concentrate on industry and the railways before the additional burden of enforcing the ordinance for private homes fell on its shoulders on October 1st, 1947. It has been said that a successful smoke inspector must be an engineer, a diplomat and a salesman all rolled into one. Certainly there has been no lack of variety in the tasks performed by the Bureau.

The steady weeding out and elimination of industry's many smoking chimney stacks has been the main if not the most spectacular function of the Bureau's thirteen smoke inspectors. The best answer to a smoking stack is the installation of mechanical stoking and the proper instruction of the fireman. In 1947, almost 2,500 stacks were visited and corrected for smoke. In some cases the management decided to renew their mechanical stokers, while in others, repair or readjustment was sufficient. Many plants installed

new indicators and steam jets. Often it was only necessary to instruct the fireman. Besides this work, the Bureau undertook the routine annual inspection of combustion equipment and approved plans for close on 2,000 new installations.

The Bureau co-operated with the smoke inspectors provided by the railway companies themselves to keep a strict watch on smoke emitted by railway engines within the city limits. Firemen were instructed in the art of correct firing and, when necessary, penalized by a system of fines and suspensions. During 1947 over 200,000 observations of locomotives were recorded; 11,000 warnings were given and in 150 cases firemen were suspended for a few days for violating the smoke ordinance.

The reduction of smoke emitted by railway engines within the City of Pittsburgh during the last year is not only due to the enforcement of the smoke ordinance for steam engines, but to the introduction of oil-burning Diesel electrics. The credit for the improvement falls to the five railway companies whose tracks pass through the city. Within the last three years they have all set out on ambitious and far-sighted programmes of capital re-investment. The five companies have all together budgeted close on 75 million dollars for improvements which are of direct benefit to smoke abatement within the city limits. The main item in the budget is the cost of new Diesels. In October, 1946, 29 Diesel engines operated within the city limits. In October, 1947, the number was 56 and by 1948 it had shot up to 185 out of a total of 600 engines. One Diesel will do the work of two to three steam locomotives, being more powerful, easier to maintain and having a higher thermal efficiency than the conventional steam engine. The saving in the fuel bill is especially significant in shunting operations where the Diesel's flexibility has proved to be of such advantage that in the near future all shunting engines operating inside the city will be Diesels.

Besides the railways and industry,

city buildings and homes were responsible for much of the air pollution. The figures set out below giving the coal consumption of these four sections of the community in 1940 are a guide to how much smoke these sections could produce rather than how much they did produce :

<i>Consumer</i>	<i>Percentage Coal Consumption</i>
INDUSTRY	
Steel mills, power companies, manufacturers	39
RAILWAYS	
Coal used within the city limits	17
COMMERCIAL	
Stores, office buildings, apartment houses	31
DOMESTIC	
Homes housing one or two families	13

Domestic consumers cannot be neglected in the overall picture of smoke abatement, even though they account for only a small percentage of the coal consumption. Research has shown that the inefficiency of domestic stoves causes much smoke. A household stove usually emits about four times more smoke and ash than the stack of an electric power company. Moreover, smoke from domestic chimneys is much more effective for smog formation. It would be misleading to attempt a more precise generalization as to the comparative smoke production of domestic consumers.

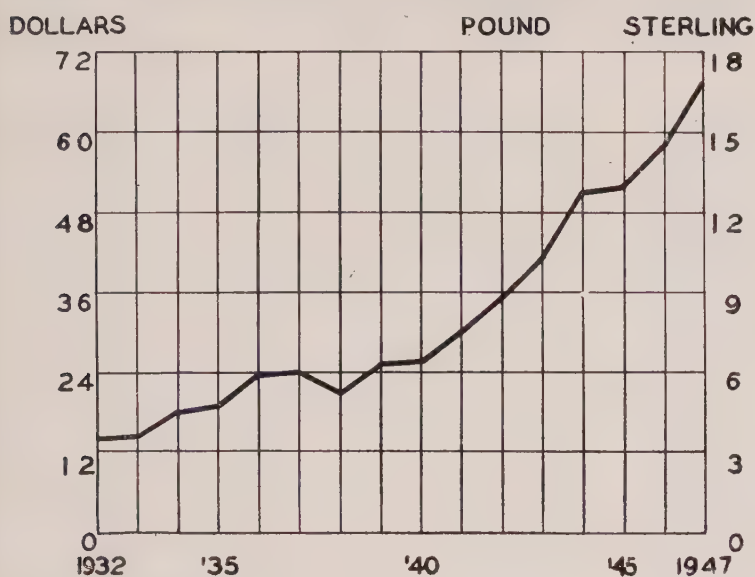
By October 1st, 1946, the majority of commercial consumers had installed smoke abatement devices best suited to the size of the installation. The larger stores, office buildings and apartment houses could afford mechanical stokers to burn high volatile coal. Those commercial consumers without mechanical stokers could henceforth buy only smokeless fuel. On October 1st, 1947, Pittsburgh's Smoke Ordinance became fully effective. In future, private homes could legally purchase only smokeless fuel. No civil education programme could teach 150,000 householders to burn high volatile coal smokelessly ; under the new law, smoke would be abated at the source.

The Domestic Problem

Pittsburgh's answer to domestic smoke pollution was beset with many practical difficulties. It had been strongly objected to by local coal mining companies who feared the loss of Pittsburgh as a market ; by coal miners' unions who feared unemployment ; by wholesale and retail coal merchants who objected against this upset in their smooth-running sales arrangements. Even once the law was imposed, there was good ground for the belief that a fuel shortage would leave Pittsburgh with no alternative but to repeal the clause of its Smoke Ordinance referring to domestic consumers. When the ordinance became law, local coal companies signed contracts selling their high volatile coal elsewhere, while coal dealers experienced difficulty in obtaining the legal fuels such as low volatile coal, anthracite, coal briquettes and low or high temperature coke. In order to ensure the sale of smokeless solid fuel for hand-fired equipment, retail coal merchants were required to obtain a licence and make a cash deposit, which would be forfeit if the terms of the Smoke Ordinance were violated. Repeated violations would result in the licence being withdrawn. In the period of switching over to smokeless fuel, fuel was inevitably in short supply and prices rose.

Pittsburgh's coal-using citizens forgot that the wages of coal miners had trebled since 1938 and coal prices had risen accordingly. The public was apt to blame smoke abatement for this all-round increase in prices. In actual fact, smokeless fuels sold at between 10 and 100 per cent. above the price of 10 dollars a ton for high volatile coal. Burning smokeless fuel required a new technique, and the Bureau of Smoke Prevention distributed leaflets and sent its men to show how it should be done. Complaints were often received about the poor quality of the coal sold by dealers. Unhappily, the Smoke Ordinance protected the consumer only as far as the smoke-making quality, the volatile content of his coal, was concerned. It did not protect him

WEEKLY EARNINGS OF UNITED STATES BITUMINOUS COAL MINERS 1932 TO 1947



from being sold coal unfit for burning, coal with a high ash content. At the time being, the best solution to this problem is thought to lie with the coal companies themselves; if they will guarantee the supply of coal with an ash content not exceeding a stated limit and with volatile matter not exceeding 20 per cent., their coal would be certified as legal smokeless fuel within the city limits.

The test for the new Smoke Ordinance came in January, 1948. With three days' coal supply on hand, the city's Smoke Ordinance became front-page subject matter. In the city council, a motion was tabled calling for the annulment of the clause dealing with the coal supply for homes housing one or two families. Fortunately, the retail coal merchants threw their support behind the Ordinance. Re-legalizing the sale of high volatile coal would throw coal dealers into fresh confusion due to cancellation of orders for smokeless fuels. Besides, even high volatile coal was in short supply. Local newspapers published articles describing the benefits to Pittsburgh's atmosphere since the Smoke Ordinance was put into effect. But it was the staunch confidence of the Bureau of Smoke Prevention that Pittsburgh could make it, that tipped the scales. Pittsburgh never ran out of coal and before long a mild February and March allowed coal stocks to be built up again. Pitts-

burgh had pulled through its first winter, its Ordinance intact, and valuable experience gained.

During 1948 the Bureau of Smoke Prevention has made a determined effort to see that Pittsburgh will have a good supply of smokeless fuel for sale this coming winter. Arrangements have been made for supplying house-holders with a 50-50 mixture of $\frac{1}{2}$ in. anthracite and 2 in. high volatile coal. This fuel is "smokeless" as defined by the Ordinance and it is expected to sell only 20 per cent. above the price

of high volatile coal. The other types of smokeless fuels will also be available. Early in 1949, a low-temperature carbonization plant with an annual output of 300,000 tons of "Disco" is scheduled to be in full operation.

Greater Pittsburgh

The success of smoke abatement within the City of Pittsburgh, which houses 700,000 inhabitants in an area of 50 square miles, has created a demand for extension of the Smoke Ordinance to the surrounding industrial belt. At the present moment, a Smoke Ordinance is being prepared for "Greater Pittsburgh," which is known as Allegheny County and houses 1,500,000 inhabitants within an area of 750 square miles. Allegheny County is the greatest coal-using area in the world, with an annual coal consumption conservatively estimated at 40 million tons.

A new feature of smoke abatement within the county is that the steel industry, with its open-hearth and blast furnaces, its Bessemer converters, its puddling, sintering and byproduct coke ovens, is to come within the terms of the Ordinance. An advisory committee is at present investigating the possibility of drawing up suitable specifications. Only a few years ago, atmospheric pollution from cement works was thought to be well nigh unavoidable. To-day, after extensive experimental work, the three cement

works within the city limits have installed washing equipment which makes it hard to believe that they once used to envelop their surroundings in a manmade snowstorm. Open-hearth furnaces, the giant beacons of the steel industry that throw vast plumes of ochre iron oxide dust into the air, are now being tamed. Experimental washing equipment installed at two Cleveland open-hearth furnaces has proved effective, and points the way to less expensive, standardized equipment.

Basically, there are two different types of smoke-producing industrial equipment. Many types of fuel burning equipment yield a higher efficiency when smoke abatement equipment is installed. Industry merits but little praise when it eliminates smoke produced through inefficient combustion at the cost of a large fuel bill. There is a second type of industrial plant where there is no obvious short-term monetary reward for the installation of smoke abatement equipment ;

it is a long-term investment, eventually repaid by an increased output from healthier workers. In a period of depression, we cannot expect industry to install equipment which does not immediately pay for itself. In a period of prosperity, industry can afford to dispose of the pollution which it is producing, be it of air, water or landscape. A leading economist recently expressed the opinion that the United States is experiencing the world's biggest boom. Whether or not we accept his statement, there is little doubt that the present period of prosperity is the most opportune moment for voluntary civic improvement projects.

What has made Pittsburgh's Smoke Abatement programme a success? There is no single answer, but undoubtedly, determination and hard work on the part of public-minded citizens played its part. The organizing ability shown by the Allegheny Con-

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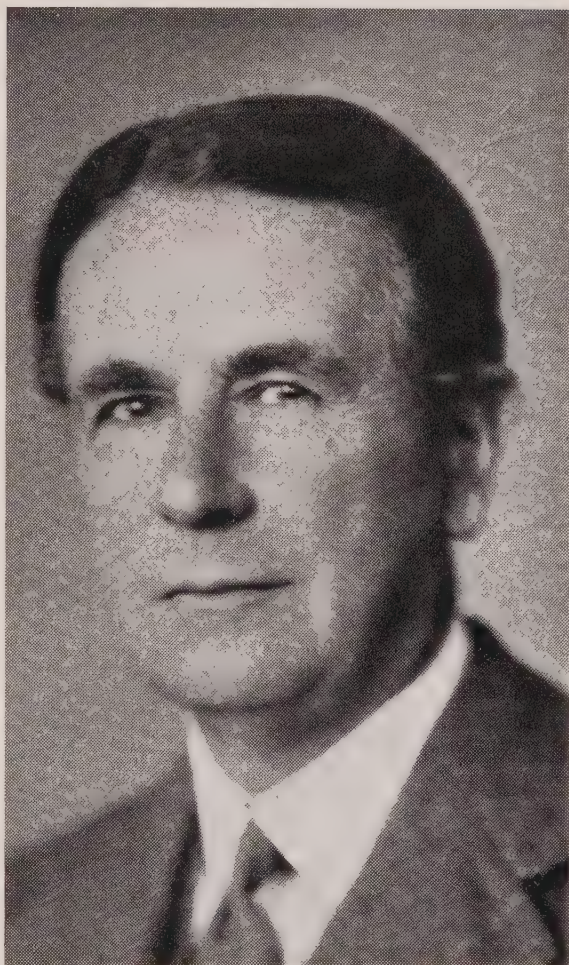
Advertisement, the key to popular support

The New President

LORD SIMON OF WYTHENSHAWNE needs little introduction to members of the National Smoke Abatement Society. Not only was he one of the founders and first honorary secretary, in Manchester, of one of our parent bodies, the Smoke Abatement League of Great Britain, but much more recently his chairmanship of the Fuel and Power Advisory Council, which published the outstandingly important report on *Domestic Fuel Policy*, has earned him the gratitude of the whole movement.

Lord Simon is Chairman of the B.B.C. and is an authority and writer on housing. He has been Lord Mayor of Manchester, and his title reflects his close association with the imaginative development of Wythenshawe and his generous gift to the city of Wythenshawe Park. The new President was in the United States at the time of the Cheltenham Conference, but we hope to hear him deliver his first Presidential Address at Harrogate in September next year.

If we look either backwards to our beginnings or forward to the future progress we can now discern, the appropriateness of Lord Simon's Presidency, especially at this important stage of the Society's existence, will at



once be recognized, and we are fortunate that, despite his many other responsibilities, he was able to accept this office.

Pittsburgh Fights Smog—concluded.

ference on Community Development made it possible for the Conference to secure the publicity vital to the success of smoke abatement. The public was made smoke conscious by newspaper articles, by wireless talks, by public speakers, by posters, by pamphlets. A movement to do something was changed into a programme of action with legislation. The city council, ever ready to further the well-being of the community, hammered out a workable Smoke Ordinance. Lastly, the

Bureau of Smoke Prevention went about its task with zeal, yet with restraint.

After much effort, Pittsburgh's atmosphere has become more bearable. Yet, even in the last year, Pittsburgh received less than one-third of the available sunshine. While the railroads and city consumers have pulled their weight, the worst offender against dust-free smokeless air, the steel industry, remains as yet untamed. The era of successful smoke prevention has only just begun.

Deputation to the British Electricity Authority

At both the 1946 and 1947 conferences of the Society, resolutions, urged particularly by representatives from the Sheffield and Don Valley district, were passed expressing grave concern about the emission of grit and sulphur acid gases from power stations. After the Edinburgh conference in 1947 the Executive Council decided to ask the Central Electricity Board to receive a deputation, but in view of the impending changes in the industry the approach was postponed until after the new British Electricity Authority had been established. Following is the substance of a report to the Executive Council of the meeting that followed.

ON July 21st, 1948, a letter was addressed by the Society to the British Electricity Authority saying that the Society, the membership of which consisted largely of local authorities, was frequently asked for information as to the policy of the Authority with regard to the emission of grit and sulphur in the flue gases from power stations, and asking if they would be good enough to receive a deputation consisting of the Officers of the Society and the Chairman of the Technical Committee, to whom the policy of the Authority could be outlined.

Lord Citrine and Mr. Hacking very kindly received the deputation on Friday, August 6th, when the removal of dust and grit, and the removal of sulphur, two very distinct problems, were fully discussed. The industry in the past had done as much as any other industry to eliminate grit, and the Authority has both these difficult problems fully under consideration, and experiment and research are being carried out with a view to the evolution of the most practicable solution at the minimum cost.

Some of the older stations had relatively low chimney stacks that

tended to concentrate the deposit of grit and this had been aggravated by the increase of ash in coal now supplied to power stations. With mechanically-fired plant it is the practice to install efficient grit-arresting plant and in pulverized fuel plants to install electrostatic precipitators. In many new stations mechanical grit-arresting plant had been installed in front of the precipitators. With either plant no difficulty was anticipated in keeping below the limit of .4 grains per cubic foot, and with chimneys $2\frac{1}{2}$ times the height of surrounding buildings discharging into still air any dust escaping should be widely distributed. The capital cost in the newer pulverized fuel plant amounted to some 4s. 0d. per lb. of steam per hour, or say, £2 4s. 0d. per kilowatt of plant installed.

At Battersea and Fulham washing plant both using lime had been installed but both had been discontinued for defence purposes during the war. The former was being restored but the high cost and large amount of material necessary had been responsible for the postponement of Fulham plant. Mechanical grit arrestors were being installed which would remain when washing plant was restored.

Gas-washing plant for removing sulphur will be installed at the new Bankside station. With a view to obtaining further information as to the most efficient washing plant, experimental plants similar in principle to those at Battersea and Fulham respectively, and possibly others were being installed at the old Bankside station. The total additional running cost of gas washing plant including capital charges, is estimated to amount to 10s. 0d. to 12s. 0d. per ton of oil consumed.

In new stations provision is made in

the layout of the plant for the subsequent incorporation of a gas-washing plant, should this prove to be necessary when the station was in operation.

The deputation felt that the British Electricity Authority were fully sym-

pathetic and were prepared to take every practicable means to eliminate the emission of grit and sulphur, although the industry in this country was being compelled to carry a burden that was not being imposed in any other country.

WATER IN THE FUEL RATION

*The Editor,
Smokeless Air.*

Sir,

I was amazed to read the letter by Dr. G. W. Himus on water in coke which appeared in the summer number of *Smokeless Air*. I should have thought that he would have been aware of the work carried out by the South Metropolitan Gas Co. several years ago, when it was shown that a minimum of about 3 to 4 per cent. of moisture in coke was desirable.

His indignation at having to pay for water in his solid fuel is also very surprising, in view of the fact that he is well aware that he cannot possibly escape paying for water when he buys other natural solid fuels. Why he should select coke for his attack is difficult to understand.

Yours, etc.,

JOHN ROBERTS.

Cheltenham.

Sir,

Your correspondent, Dr. G. W. Himus, is apparently ignorant of the fact that all coal as mined has a percentage of moisture, sometimes as high as 20 per cent. Carbonization reduces this moisture, but even after 9 hours at 650 deg. C. the moisture cannot be reduced below 3 per cent. Higher temperatures would also remove all inflammable gases and leave the product difficult to burn.

Yours, etc.,

A. VAUGHAN COWELL.

London, E.C.3.

Dr. Himus has sent the following reply to the above letters :

Sir,

This correspondence arose from a letter in your Autumn-Winter (No. 65) issue, when Miss Sydney M. Bushell complained about a very wet consignment of smokeless fuel which she had received. Thereafter the discussion has been confined to water in carbonized fuels. The criticisms by Mr. John Roberts and Lt.-Col. A. Vaughan Cowell that I have not mentioned other solid fuels are therefore quite beside the point. I would draw Lt.-Col. Cowell's attention to the fact that, while it is easy to accuse an opponent of being "apparently ignorant of the fact that all coal as mined has a percentage of moisture . . .", before doing so it is advisable to ascertain whether the accusation is founded on fact.

I can assure Mr. Roberts that I am not unaware of the work carried out by the South Metropolitan Gas Co. In fact, the late Professor Bone and I, in "Coal, Its Constitution and Uses" referred to it on p. 534. Nevertheless, I remain unrepentant: as a purchaser of coke nuts, for which I am forced to pay over 80s. 0d. a ton, I strongly resent buying water, which I can add, if I so desire, at the price of coke.

As to Lt.-Col. Cowell's statement that "even after 9 hours at 650 deg. C. the moisture cannot be reduced below 3 per cent. . . .", words fail me. I will not presume to accuse Lt.-Col. Cowell of ignorance, apparent or actual. I merely remark that he and I do not speak the same language; his definition of "moisture" is evidently quite different from mine.

Yours, etc.,

G. W. HIMUS.

*Imperial College of
Science and Technology.*

(This correspondence is now closed.—Ed.)



Conference at Cheltenham

AS far as we can judge from comment at the time and appreciative letters afterwards, the Society's Cheltenham conference was generally regarded as one of the best ever held. The papers and reports (all now available) were given top marks, and the discussions were considered to have been unusually informative and to the point. The one complaint about the meetings was that they were not so lively as before—was this a sign of loss of enthusiasm? We do not think so. Liveliness may be amusing, but getting down to brass tacks, as at Cheltenham, is more enduring.

The hospitality of the Mayor and the Borough Council was generous and delightful, and the reception given to the conference was exceptionally enjoyable. In addition to the Mayor, who was our host and who also opened

the conference, our gratitude is due also to the Deputy Mayor, Alderman Clara Winterbotham, and to Cheltenham's Independent Member of Parliament, Mr. D. L. Lipson, for presiding over two of the sessions. The opening session was in charge of Sir George Elliston, whose retirement from the Presidency, as decreed by constitution, was something that everyone regretted should have to happen.

A word is said on another page about the address we were privileged to hear from the Minister of Fuel and Power, who is seen in the photograph above with other platform people. From left to right they are: Mr. Charles Gandy, Chairman of the Executive Council, Sir Ernest Smith, Hon. Treasurer, Mr. Gaitskell, and Mr. D. L. Lipson.

Education for Industrial Smoke Prevention

READERS of SMOKELESS AIR will not need to be reminded that during the early part of the last war, increased industrial production for essential purposes made it necessary to secure the best possible use of home-produced fuels. One of the fields in which the Fuel Efficiency Committee of the Ministry of Fuel and Power realized great savings were possible, was in industrial boiler-houses providing the boiler house operatives were properly instructed in the principles of combustion and correct plant operation.

Experimental instruction courses in Boilerhouse Practice fully confirmed the need for the training of boilerhouse staffs, as well as the savings likely to accrue from it, but it was also realized that short courses of this nature could do little more than touch the fringe of the problem and that a long-term policy was necessary. Negotiations with the City and Guilds of London Institute resulted in a syllabus being drawn up for standard progressive courses—Preliminary, Intermediate, and Advanced grades—in Boiler House Practice. With encouragement from the Ministry of Education, Local Education Authorities have included these courses, based on the City and Guilds syllabus, in the normal programme of technical colleges throughout the country.

At the same time the Institute of Fuel established qualifying examinations for Associate Membership, divided into Sections "A" and "B". The first is for candidates with a general education in science and engineering, and the second, which may only be taken after qualifying in, or obtaining exemption from, the first, is for those with more specialized training in fuel technology. There thus has been set up an educational ladder by which a keen boiler-house operative can climb from the firing floor to corporate membership of the Institute of Fuel.

While the general trend has been to steer training in the general educational channels there are limitations to this policy. It is not always possible, especially in the less populated districts, for students to attend courses at technical colleges, nor are they, particularly the older men, always prepared to attend courses continuing over long periods. To combat these difficulties "ad-hoc" courses are arranged to suit the needs of local industries by the Regional Offices of the Ministry of Fuel and Power.

Many visits are also paid to works and factories by individual Engineers and Stoker Demonstrators of the Ministry and instruction given to boiler-house operatives on the correct operation of their plants. In addition a candidate, successful in the Preliminary grade B.H.P. examination, may apply to take a practical test on the plant on which he actually works and if successful have his "Theory" certificate endorsed to that effect by the Principal of the college issuing it.

While substantial savings in fuel have resulted from the training and increased efficiency of certificated operatives there is also another benefit, of great importance to those interested in smoke prevention, to be derived from the training. Well operated plant has led to much less smoke and grit emission. In fact as the Minister of Fuel and Power remarked at the Annual Conference of the Smoke Abatement Society held at Cheltenham on September 30th, 1948, it would be true to say that a smoky chimney is usually an indication of bad plant operation. With a knowledge of the principles of combustion, allied to correct methods of stoking and proper plant control a good stoker can reduce smoke and grit emission to a minimum. Sanitary and Smoke Inspectors, particularly those living in industrial areas, will need no convincing of the necessity

for this in which education plays a vital part. They and all others interested in smoke prevention should do whatever is reasonably possible not only to make the courses known but to take full advantage themselves of the opportunity for gaining further practical experience and encouraging others to do likewise.

The value of this training is realized by the Royal Sanitary Institute whose Council have recently recognized the City and Guilds of London Institute Intermediate grade course in Boiler House Practice as satisfying clause 2 of the Smoke Inspectors examination regulations. Sanitary Inspectors and others who wish to qualify as Smoke Inspectors have now a much greater opportunity of obtaining training in this field than when just a few colleges were recognized as fulfilling the requirements of the R.S.I. They are in fact already taking advantage of it judging by figures of increased enrolments at technical college courses since the decision was made known.

Details of all courses in Boiler House Practice and allied subjects at a large

number of centres are published in "Fuel Efficiency News" prior to the beginning of the training session. Further details may be obtained locally either from technical colleges or from the Secretaries of Fuel Efficiency Committees at Regional Offices of the Ministry of Fuel and Power: the latter will wherever demands arise, endeavour to arrange training courses. The theoretical instruction given at all lecture courses is supplemented by discussions, demonstrations and visits to plants and in this way much training of a very practical nature is given.

Employers, whether they be Industrialists or Local Authorities, are asked to give every possible assistance to enable their employees to attend suitable courses of instruction. In so doing they will materially assist the Nation to save fuel—the need is still as great as ever—as well as reducing the costs to themselves as it has been proved that an efficient stoker can achieve results with less fuel. They will also in a very practical way materially further the cause of smoke abatement.

A NEW DUST COLLECTOR

THE increasing seriousness of dust and grit emission from industrial fuel-burning plant, and the difficulties of prevention, need no emphasis in these pages. Readers will be interested to learn of a new type of dust collector in which a principle quite different from that of the cyclone or other methods, is employed.

Very briefly, in this the gases to be cleaned pass through a specially slotted sheet bent into the form of a cone. The gases pass at high velocity into this cone and out through the slots. Aerodynamic forces that are set up result in the dust particles being directed away from the cone faces so that they remain suspended as a thin cloud layer immediately in front of the filter surface, while the clean air escapes through the slots. The dust is carried at high speed to the narrow outlet end

of the cone, where it is continuously withdrawn with a very small percentage of the gases into a secondary circuit. Here the dust passes through a small collector for precipitation and the gases return to the inlet of the first cone.

The advantages claimed for this collector include its very high efficiency, practically complete absence of erosion on the filter surface, little tendency to clog, low resistance with comparatively low power consumption, high capacity, and savings in space and steel. It can be used for many processes, including those where the dust is collected for use—as in the preparation of certain foods—but from our point of view its interest lies in its value for the removal of dust and grit from boiler flue gases and from other processes. Published figures from actual tests taken on test
(Concluded on page 27)

An Invited Impression of

Guilty Chimneys

By Noel Carrington

A SHORT while ago the newspapers carried a story about a town in the United States where the smoke from the factories about the town lay so densely over the inhabitants that some thirty of them died and many hundreds lay at their last gasp, as one might say, in the hospitals. The Americans had coined a word for it. It was a "smog." This remarkable case of mass suicide in a community seemed to me somewhat extraordinary even in the atomic age, although it was accorded only a small paragraph in the daily papers. It seems, however, that as for almost every wickedness amongst us there is a good precedent. Nor need one go so far back as the plagues which God visited on the Egyptians because they did not let the Israelites go. I find in "Guilty Chimneys" that a similar incident occurred in Belgium in 1930, on which occasion fifty persons succumbed.

If I am asked to pass some opinion on this excellent little book* it is that it makes the case against the enemy almost too black. It gives us not one but a dozen sufficient-in-themselves cases against smoke, so that I am left with the wonderment that we any longer tolerate such a nuisance when it prevents us from enjoying nearly everything that we claim to value most—health, sunlight, beauty, with I don't know how many economic losses besides. Personally I feel that it would be time well spent if some more thought were given to this very question—the psychology of the smoke nuisance, as one might call it. Why on earth do we put up with it? If we could discover the answer to that question, may be the sky would be clearer than it is.

It is not the slightest use pinning one's faith on economic good sense. Why do we in England spend some

thirty million pounds (I think the figure is) on tobacco, which will go up in smoke except for the stubs, which will be wasted anyway, when we desperately need the dollars for food and machines and a dozen other essential things. To non-smokers like myself all this smoking is just another smoke nuisance about which I only grow intolerant if I am travelling in railway compartments reserved for those who don't smoke but invaded by those who do. But we now know that the smoking habit is not cured even by the most shattering economic sanctions in the way of taxes, and that if cigarettes become scarce enough they take the place of gold and silver as currency. It has become a habit which cannot be cured except by some personal effort and Governments have ceased to expect the effort any longer. Smoky chimneys are also a habit. The difference is that it is a habit which does not in itself give any pleasure to those who make the smoke. It is just a habit, nevertheless.

One way to break the habit would be to forbid any bituminous fires after a certain date, in the way that we were forbidden to show lights during the war. That is not wholly impracticable, but unlikely to happen. Or we could suggest an economic sanction against the smoky fire; that is to say, a good rebate to houses which emitted no smoke. That would operate more slowly, but I believe the method was successful in some Continental cities. It depends on the inducement. No doubt much more coal would have to be treated to render it smokeless, but with the demand the plants would be erected. All the same I believe domestic smoke could be eliminated in, say, five years' time by this method.

Industry would need sterner measures, because the cost of elimina-

* Published by the Society, 1/-. By Post, 1/2d.

tion plant is high for small firms even if of no account to big companies. A stiff rebate of rates would soon have its effect, however, if it were compulsory on local authorities to make the discrimination. We all know of gross pollutions of the atmosphere which continue year after year in spite of complaint because the interests are too powerful to be brought to reason. In every case the psychological approach must be studied. With private industry it is the balance sheet that talks.

It seems wrong that, with such an overwhelming case made out in this booklet under review, we should need to think of penalties instead of common sense and decency, but I prefer to be realistic. I am one for open fires myself. I know the force of habit and the laziness that comes from custom. I am still awaiting correction.

The Bradford Bill

There has in a number of cases been some opposition to the smoke prevention clauses—prior approval and smokeless zones—in the new local Acts that more and more local authorities are now securing. This opposition has in every case been overcome in due course by the weight of the argument, but it has on some occasions been a matter of concern to the promoters.

Such opposition was at first voiced at Bradford, where a Bill with smoke prevention clauses is under discussion. On further consideration, however, the Bradford Chamber of Commerce decided not to raise objection. One speaker considered that it would be a very retrograde step to maintain such opposition. Another pointed out that as Manchester, Coventry and Barnsley already had smoke abatement powers it was obviously the intention of the Government to eliminate the smoke nuisance, and he could not imagine that the Government would make an exception in the case of Bradford (*Yorkshire Observer*, Nov. 24th, 1948).

This reveals a significant change of attitude that, if its implications are considered, will be seen to reflect a

material advance in the evolutionary process of the new forms of smoke prevention legislation, that despite its gradualness, is now actively in progress. The idea of smokeless zones and prior approval are becoming accepted. They are ceasing to be strange conceptions to be regarded only with suspicion. They are winning a place on the map.

The Nautilus Coke Boiler



We illustrate the new Nautilus Coke Boiler introduced by Radiation Ltd., inquiries about which should be made to the Davis Gas Stove Company, 7 Stratford Place, London, W.1. Designed on "cabinet" lines, it is finished in black and white, or black and cream, enamel. Three rotating rocker bars form the grate. Rotating these, by a special tool provided, crushes any clinker and drops it all into the ashpan. Waterways are on all four sides. Fuel capacity is 0.75 cubic feet, and the boiler gives 80 gallons of water per hour at 100 deg. F. or 40 gallons at 150 deg. F. The retail price is £29.

The Deterioration of Leather by Polluted Atmosphere

R. Faraday Innes, F.R.I.C.*

THE general problem of deterioration of leather with age has been studied by the British Leather Manufacturers' Research Association over a number of years. The type of deterioration studied should not be confused with that of old footwear rendered cracky by injudicious care or treatment nor of leather subjected to extreme mechanical strain such as machine belting, but to leather articles which have become weak and powdery when stored with or without occasional use for a number of years in dry conditions.

Such articles are principally upholstery, luggage and books. Some years ago numbers of expensive arm chairs in clubs, board rooms and book-bindings in public and private libraries showed this type of deterioration which was having a serious effect on the reputation of leather.

In the Report of the Committee of the (then) Society of Arts on Leather for Bookbinding (1905) this deterioration of leather was attributed rightly to the excessive use of sulphuric acid by the thinner or dresser for the purpose of attaining bright shades during dyeing. This conclusion undoubtedly led to a considerable decrease in the careless use of sulphuric acid in preparing the leather, but in spite of this, acid damage continued. Some 20 years later another source of sulphuric acid in leather was suspected and was finally traced to the small amounts of sulphur dioxide in the atmospheres of all towns with populations over about 50,000.

A few examples may be mentioned as proof of this statement. A book half bound in Morocco had become rotted in the back whereas the sides were

perfectly sound. When examined by an improved method of analysis the back was found to contain 4.7 per cent. of sulphuric acid and the sides were free from sulphuric acid. This clearly absolved the leather manufacturer from blame and indicated that the leather back had absorbed sulphur acids from the air.

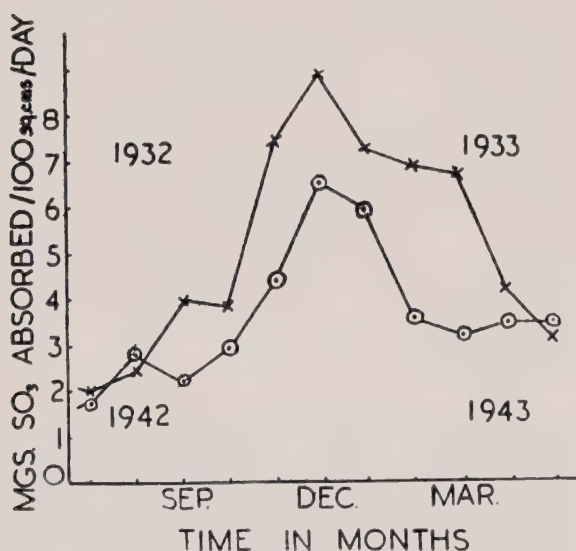
A set of Dickens was bound in whole leather in 1900 and stored in a glass bookcase in a London suburb. A twin set was stored in the same suburb but on open shelves. By 1943 the set on the open shelves had all badly decayed and were found to contain 3 per cent. of sulphuric acid whereas those in the bookcase were in perfectly sound condition and free from sulphuric acid (see photograph).



* Of the British Leather Manufacturers' Research Association.

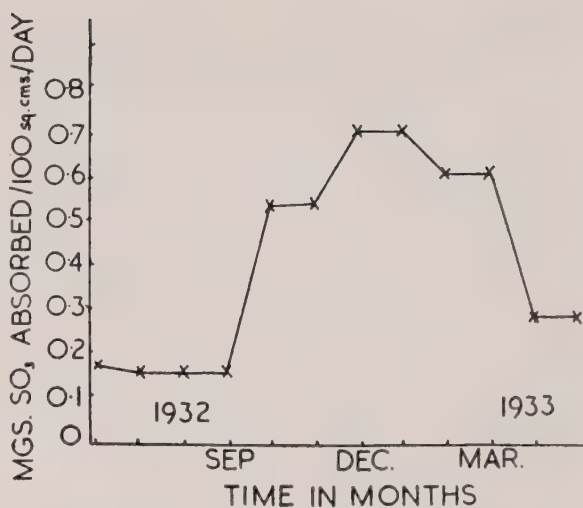
In 1903 a number of books were bound at Windsor and stored in the Round Tower library. Three of them were examined in 1929, when two were found to be badly decayed. These two had been kept in Buckingham Palace for 10 years out of the 26 and contained over 5 per cent. sulphuric acid, whereas the other which had not left Windsor contained only a trace of sulphuric acid. This is a clear indication that the air of Windsor contains far less sulphur dioxide than the air of London.

The degree of pollution of outdoor city atmospheres by sulphur dioxide has been recorded by the Atmospheric Pollution Research Committee and rises in the winter and falls in the summer as shown in the diagram :—



Domestic fires and kitchen stoves contribute the main quota of sulphur dioxide whether they burn raw coal, coke, anthracite, gas or even paraffin oil, since all these fuels contain sulphur. The larger the city the more polluted the atmosphere becomes.

In the National Library of Wales or in the Swedish town of Upsala (where the domestic fuel is wood), or in country districts of Britain, books last indefinitely and acid decay is unknown. Atmospheric pollution permeates the inside of all buildings in a city and attacks leather goods stored in rooms and halls even when illuminated by electric light and centrally heated. The diagram shows the seasonal variation in pollution by sulphur dioxide of the atmosphere of a London library :—



This runs parallel with the pollution of outdoor London air. Although the sulphur dioxide is only present in traces, the quantity absorbed by leather is sufficient to rot upholstery in as short a time as 5 years or bookbindings in 10 years. In an Institution such as the Department of Printed Books of the British Museum the volume of polluted air which is circulated is fairly restricted and rotting takes longer, but even so, enormous numbers of books have to be rebound three-four times in a century at a cost in labour and materials difficult to estimate. When one considers the large numbers of libraries of Government departments, municipal bodies and universities the total loss to the nation is serious.

As a result of the research carried on over the last 20 years, ways and means are now known whereby leather articles may be protected against the action of sulphur dioxide. By keeping books in bookcases or by coating them with a protective impermeable film they are shielded from polluted air or they may be stored in a room where the air has been purified and is therefore free from sulphur dioxide, or they may be treated with a material which will resist the rotting action even when freely exposed to a large volume of polluted air. Information on this method of treatment is to be found in "The Preservation of Leather Bookbindings" by H. J. Plenderleith, published by the British Museum, obtainable from H.M. Stationery Office.

(Concluded at foot of next page)

Smokeless Zones in Salford

Important Progress

THE city of Salford is preparing to make use of the powers conferred upon it in the new Salford Corporation Act, for the establishment of smokeless zones. The first areas to be considered, it is interesting to note, are those of five post-war housing schemes. When the zones are established it will be illegal to supply coal to any premises in the area, and the tenants will have to use gas, electricity, coke, or other smokeless fuel for all purposes.

This was explained by Mr. F. Taylor, the Smoke Abatement Officer, at a meeting which was itself an event of considerable significance. Aware of an actual or potential antagonism to the smoke prevention measures (which also include "prior approval") of the fuel merchants operating in the city, a meeting with their representatives was convened by the Health Committee for the purpose of explaining the scheme, ironing out difficulties, and appealing to them to help right away in educating the public in the advantages of these fuels. Alderman W. W. Crabtree, Chairman of the Health Committee, presided.

Mr. Taylor said that the five estates had been selected for the opening stage of the new anti-smoke campaign because they were equipped with grates capable of burning smokeless fuel, or could be so equipped. In due course the areas would be linked up by other smokeless zones until the whole of West Salford was smokeless—and then the bordering authorities of Eccles and Swinton and Pendlebury (from whose direction the prevailing south-west wind came) would be asked to follow suit.

The excellent consequences of this meeting were referred to by Dr. J. L. Burn, Medical Officer of Health for Salford, in a "Progress Report" read

at the Cheltenham Conference. He said that the merchants were satisfied that they had, by having a preview of the projected design, a reasonable opportunity of catering for, and cultivating, a greater demand for smokeless fuels.

"Certain difficulties," he continued, "that were not entirely unknown to us, were referred to and grievances ventilated. Illustrative of the spirit of co-operation engendered by the meeting is their proposal for a further discussion with the promoters of the scheme, the local coke producers, the Fuel Overseer and their own representatives for the purpose of ironing out the difficulties and further their expressed willingness to exhibit smoke abatement posters in their offices, particularly if the posters advocated the use of readily obtained smokeless fuels."

We warmly congratulate Salford for their initiative and courage in selecting housing areas as their first smokeless zones, and for the wisdom of their preliminary step. We also would ask all other local authorities, and especially those who have obtained similar smokeless zone powers, carefully to note the lead that Salford has taken. Let no one think that it is too difficult—turn back a few pages and read how the same problem has been tackled, for the whole city at one step, in Pittsburgh.

The Deterioration of Leather—concluded.

The cost of this treatment does not exceed 2 per cent. of the cost of the leather and would therefore add very little to the total cost of binding. Leather can either be bought already protected or if unprotected, can be readily protected by the user.

Smoke Questions in Parliament

Smoke on the Thames

Commander Noble (C., Chelsea) asked the Minister of Health whether he is aware of the smoke nuisance in Chelsea due to river traffic; and what steps he is taking to have this kept to a minimum.

Mr. Bevan: In May the Port Health Authority drew the attention of the owners of tugs operating in the Port to the increasing nuisance from smoke, warning them that proceedings would have to be taken unless there was an immediate improvement. Arrangements are being made for all cases of black smoke emission to be investigated, and in one instance the issue of a statutory notice has been authorized by the Authority. (November 4th, 1948.)

Firegrates and Stoves

Mr. Collins (Lab., Taunton) asked the Minister of Health if he will extend to all new houses the instruction which has been given to local authorities prohibiting the installation of firegrates and stoves of unsatisfactory types.

Mr. Bevan: I am consulting my right hon. Friend the Minister of Works as to the possibility of including a condition to this effect in licences issued for the erection of houses by private developers. (November 25th, 1948.)

Thermal-Electric District Heating

Mr. Bossom (C., Maidstone) asked the Minister of Fuel and Power if estimates were obtained to enable the 25 new generating stations which are now being built to use their waste heat for district heating; and what additional cost this would have entailed.

Mr. Gaitskell: I understand that no such estimates were obtained in connection with these generating stations, the plans for which were, of course, made at least two years ago.

Mr. Bossom: Is it not an absolute scandal, when we are investing this tremendous amount of money in the provision of 25 new generating stations, that if we had only taken the trouble

to get a few estimates we could have made use of this waste heat for district heating on a wide scale in many places?

Mr. Gaitskell: I would not agree with the facile conclusions of the hon. Member, but if it was a scandal it is not one for which the Government have any responsibility.

Sir W. Wakefield (C., St. Marylebone): What development plans now exist for furthering district heating?

Mr. Gaitskell: Wherever a local authority wishes to consider a district heating scheme in connection with the building of a new power station, the British Electricity Authority are always ready to discuss the matter. Furthermore when discussions take place with local planning authorities about the site, the question is considered at that stage. (December 2nd, 1948).

Replacement of Inefficient Appliances

Mr. M. Philips Price (Lab., Forest of Dean) asked the Prime Minister whether, in view of the importance of ensuring the maximum efficiency in the consumption of coal for domestic purposes, he will take steps to instruct all the Ministers concerned to endeavour to evolve and enforce a policy by which existing inefficient coal burning appliances throughout the country will be replaced before a certain date by approved and scientific apparatus.

The Prime Minister: The importance of replacing inefficient domestic coal burning appliances by efficient ones as soon as is practicable is recognized by Ministers concerned. But my hon. Friend will appreciate that this is a long-term question and depends on a number of factors, such as production capacity, capital investment policy and also financial considerations.

Mr. Philips Price: May we take it that the Prime Minister is doing everything he can to expedite the application as soon as possible of these new scientific methods of economy in the

use of coal ?

The Prime Minister : Certainly. (December 9th, 1948.)

Smoke Abatement—Research

Mrs. Leab Manning (Lab., Epping) asked the Lord President of the Council what steps are being taken by the Scientific Research Council in respect of smoke abatement, in view of the menace to health, and the serious results to industry, commerce and transport caused by fogs such as this country recently suffered.

The Lord President of the Council (Mr. Herbert Morrison) : The reduction of smoke in the air will not prevent fogs, but it should reduce their intensity and frequency. The Fuel Research Station of the Department of Scientific and Industrial Research has studied methods of reducing the emission of smoke by using fuel more efficiently. Smoke eliminators developed by the Station for hand-fired industrial boilers are being marketed commercially. Research on the design of domestic appliances and on the production and use of smokeless fuels is in progress, but this is essentially a long-term problem. The Department has also, over many years, organized the measurement of smoke pollution to assess any change in its distribution and intensity.

Mrs. Manning : While thanking my right hon. Friend for his reply, may I ask him whether, in view of the fact that smoke in fog makes the fog heavy and therefore much more difficult to move quickly, there is not a short-term remedy which his Department has considered ?

Mr. Morrison : I devoutly wish there were, but I am afraid that there is not a short-term remedy. They have elaborated very much improved fire-places and boilers, and my right hon. Friend the Minister of Health is, in respect of new housing, urging local authorities to use new types of fire-places, and in other ways to improve the boilers. I can assure my hon. Friend that I am anxious to do all I can, but this does involve a change in equipment over a period.

Mr. Skeffington Lodge (Lab., Bedford) : Will my right hon. Friend bear in mind

the benefits which might accrue to those who insist on having an open coal fire ; and in that connection, will he also bear in mind the possibility of burning smokeless fuel in open grates ?

Mr. Morrison : That is one of the aspects of research, because it is recognized that many people wish for an open fire. That is taken into account. (December 9th, 1948.)

District Heating

Sir W. Wakefield asked the Minister of Health whether, in view of the fact that a number of local authorities now have powers to introduce domestic heating schemes, that a number of other local authorities are now seeking powers to introduce such schemes by means of private legislation, and that this method of obtaining such powers is costly and involves delay, he will now take steps to prepare enabling legislation under which all local authorities in the country will be given general powers to introduce district heating schemes subject to suitable safeguards for the various interests concerned.

Mr. Bevan : District heating is still an experiment and its immediate application is limited by the resources, particularly steel, that can be spared from other urgent work. The drafting of general legislation raises some difficult problems, among them the safeguards referred to by the hon. Members, and these are being studied.

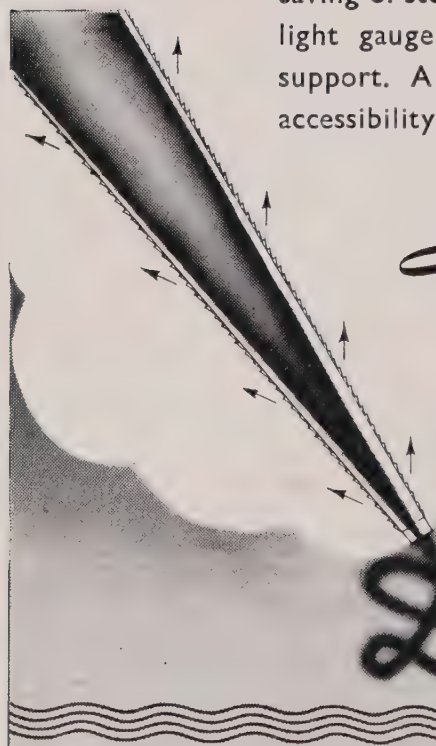
A New Dust Collector—concluded.

plant at the manufacturers' works show an efficiency of 96½ per cent. flue dust removal from stoker-fired boilers and 91 per cent. with pulverized fuel flue dust. With pulverized fuel flue dust that had been caught by an electrostatic precipitator 97½ per cent. was caught. With a view to increasing efficiency still further investigations are being made into the running of cones in series.

The Aerodynamic Dust Collector (Systeme Linderoth) as it is called, has been introduced by Musgrave & Co., Ltd., St. Ann's Works, Belfast, from whom an illustrated folder is obtainable.

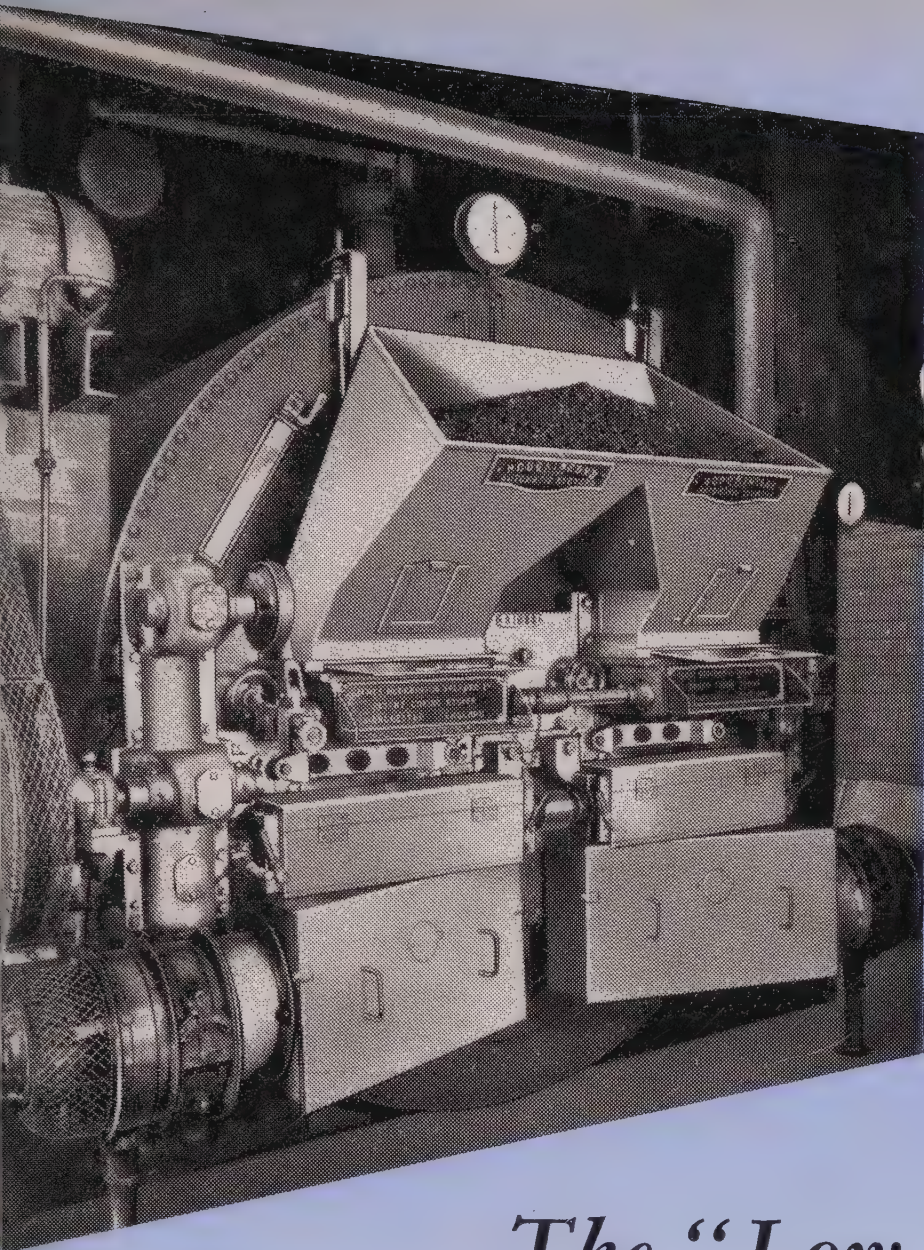
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Some advantages of the new Dust Collector are:—
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(Patent No. 10507/47C)

The new Hodgkinson "Low Ram" Coking Stoker operates with a thinner fire bed than the standard machine, thus enabling, for the first time, the flexibility of the Sprinkler Stoker to be combined with the well known smokeless and gritless qualities of the Coking Stoker.

Tests have shown that the range and variety of fuels that can be satisfactorily handled by the "Low Ram" Stoker are greater than can be achieved by any other design of Mechanical Stoker applicable to Horizontal Shell type Boilers.

We have technical representatives in all areas who will be glad to advise you.

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HOWDEN CENTICELL COLLECTOR

This collector extracts most types of fine dust and soot from air or gas used in steam-raising and other industrial plants. The Howden Centicell Collector operates on the centrifugal principle and has an extraction efficiency of from 90 to 98% according to the grading of dust dealt with. Its particular application is for pulverised coal burning boilers, stoker fired boilers, cement kilns, etc.



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SMOKELESS AIR

THE SMOKE ABATEMENT JOURNAL



No. 69

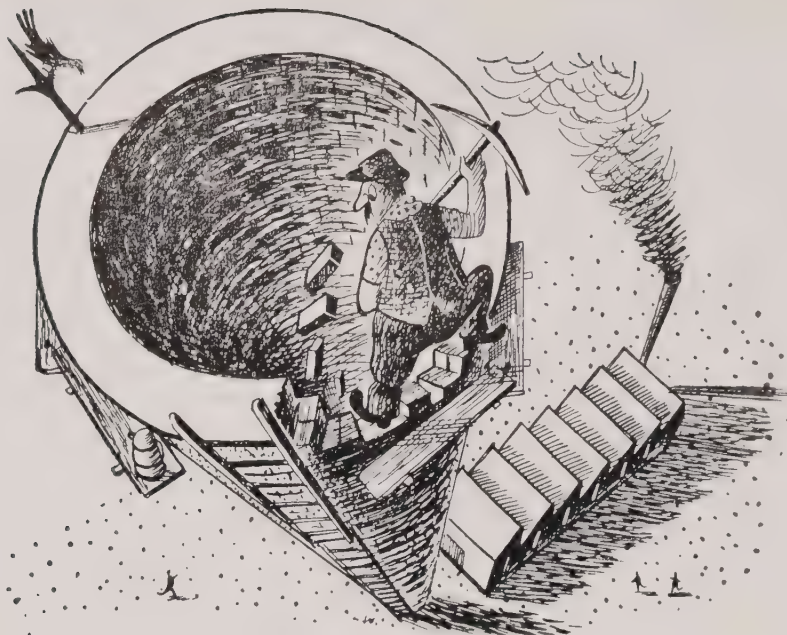
SPRING

1949

ONE SHILLING

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A few bricks dropped . . . but what a stack of trouble!

A Ministry Fuel Engineer was called in to advise upon the operation of a boiler plant whose chimney was not drawing satisfactorily. On learning that the height of the stack had previously been reduced by 60 feet, the engineer had the base opened up. There, sure enough, was the cause of the trouble—a pile of old bricks that had been thoughtlessly dropped down inside the chimney by the steeplejack, thus reducing the draught practically to nil! Once the rubble was cleared away the plant functioned perfectly, and has ever since.

Here even Homer might well have nodded, but you'd be surprised how

often it happens that quite an *obvious* cause of trouble in a factory escapes the management's eye.

No matter how confident you feel about things, you will be wise to ask the Ministry's Fuel Engineer to have a look round. He has had a great deal of practical experience and will be able to appreciate your difficulties; but at the same time he brings a completely fresh and unprejudiced mind to bear on your problems. If he has any suggestions to make, you can be sure that they will be sound ones. If he has none, you will gain confidence from the knowledge that you are making the best of a good job.

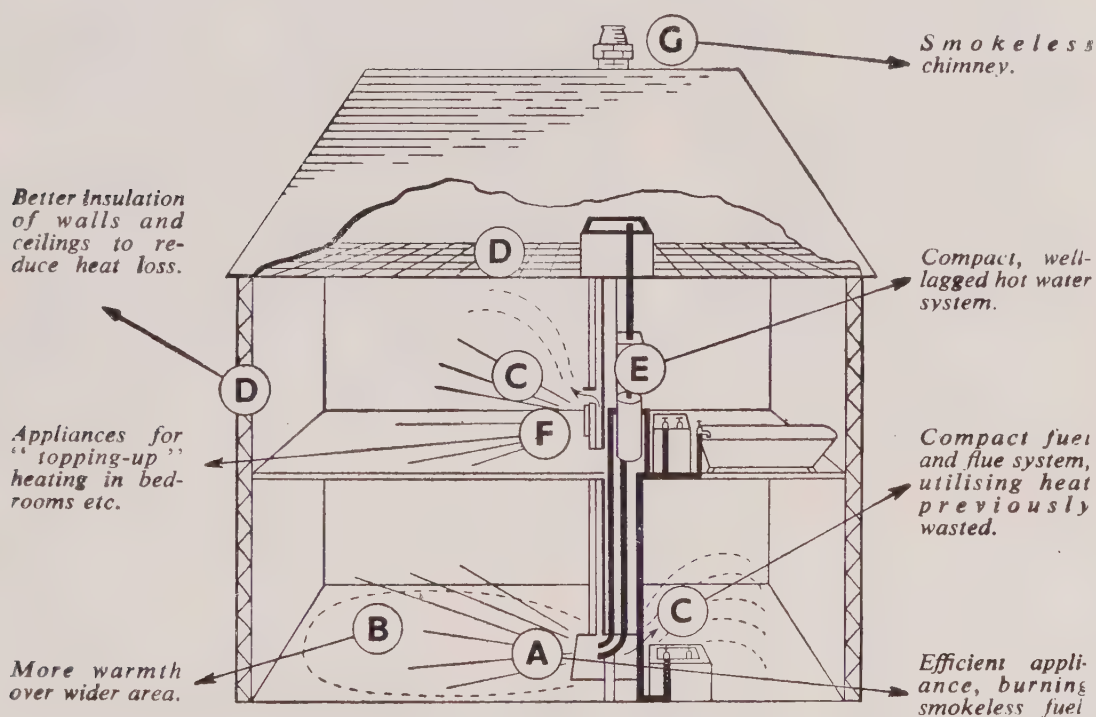
YOUR REGIONAL FUEL OFFICE

REGION	ADDRESS	TELEPHONE
Northern	Government Buildings, Ponteland Road, Newcastle-on-Tyne, 5	Newcastle 28131
North-Eastern	Century House, South Parade, Leeds, 1	Leeds 30611
North-Eastern	Mount Pleasant School, Sharrow Lane, Sheffield	Sheffield 52461
North-Midland	Block 7, Government Buildings, Chalfont Drive, Nottingham	Nottingham 77711
Eastern	Shaftesbury Road, Brooklands Avenue, Cambridge	Cambridge 56268
London	Mill House, 87/89, Shaftesbury Avenue, W.1	Gerrard 9700
South-Eastern	Forest Road, Hawkenbury, Tunbridge Wells, Kent	Tun. Wells 2780
Southern	Whiteknights, Earley, Reading	Reading 61491
Wales	27 Newport Road, Cardiff	Cardiff 9234
South-Western	12/14 Apsley Road, Clifton, Bristol, 8	Bristol 38223
Midland	Temporary Office Buildings, Hagley Road West, Birmingham, 17	Bearwood 3071
North-Western	Burton Road, West Didsbury, Manchester, 20	Didsbury 5180-4
Scotland	145 St. Vincent Street, Glasgow, C.2	Glasgow City 7636
Scotland	51 Cockburn Street, Edinburgh, 1	Edinburgh 34881
Scotland	1 Overgate, Dundee	Dundee 2179

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() (Using coke for the main winter space heating and winter water heating . . . gas for all the other heat services.)*

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PA: "Well it is all your fault—boasting about Coalite to all the neighbours—and now look at the mess we're in."

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General Secretary and Editor :

Arnold Marsh, M.Sc.Tech., M.Inst.F.

OFFICIAL NOTICES TO MEMBERS

Committee Chairmen

The following have been elected Chairmen of the Committees of the Executive Council for the present year.

General Purposes and Finance : Charles Gandy ; *Publicity* : F. J. Redstone ; *Technical* : Dr. R. Lessing ; *Conference* : Stewart Swift.

New Publications

Proceedings of the Cheltenham Conference. The complete record of the conference, including the addresses by the President and the Minister of Fuel and Power, all Papers, and a report of the Brains Trust Session. 3s. 6d. ; by post, 3s. 8d.

Address by the Minister of Fuel and Power, the Rt. Hon. Hugh Gaitskell, M.P., to the Cheltenham Conference. 6d. ; by post, 7d.

Interim Report on the National Survey of Pollution, by A. J. Cousin. Reprinted from the Cheltenham Conference Proceedings. 1s. ; by post 1s. 1d.

Smoke Abolition and the Public : Problems of Education and Propaganda, by Leslie Hardern. Reprinted from the Cheltenham Conference Proceedings. 6d. ; by post, 7d.

Smoke Prevention in Relation to Town Planning, by J. Nelson Meredith. Reprinted from the Cheltenham Conference Proceedings. 6d. ; by post, 7d.

Guilty Chimneys. The evidence of authorities against smoke. With photographs and a four-page inset of maps and diagrams in colour. 1s. ; by post, 1s. 2d.

N.S.A.S. Report, 1949 (including annual report and accounts for the year ended June 30th, 1948) has now been issued and copies are being sent to all members. Other readers may obtain copies at 3d. each, post-free.

Guide to Publications. A complete guide of available publications on smoke prevention and allied subjects issued by the Society and other publishers ; 34 items, classified and cross-referenced for subject matter. Gratis.

Full members of the Society, and appointed representatives of full members may, *on request*, obtain copies of these new publications free of charge.

N.S.A.S. CONFERENCE • 1949

at

HARROGATE

Wednesday • Thursday • Friday

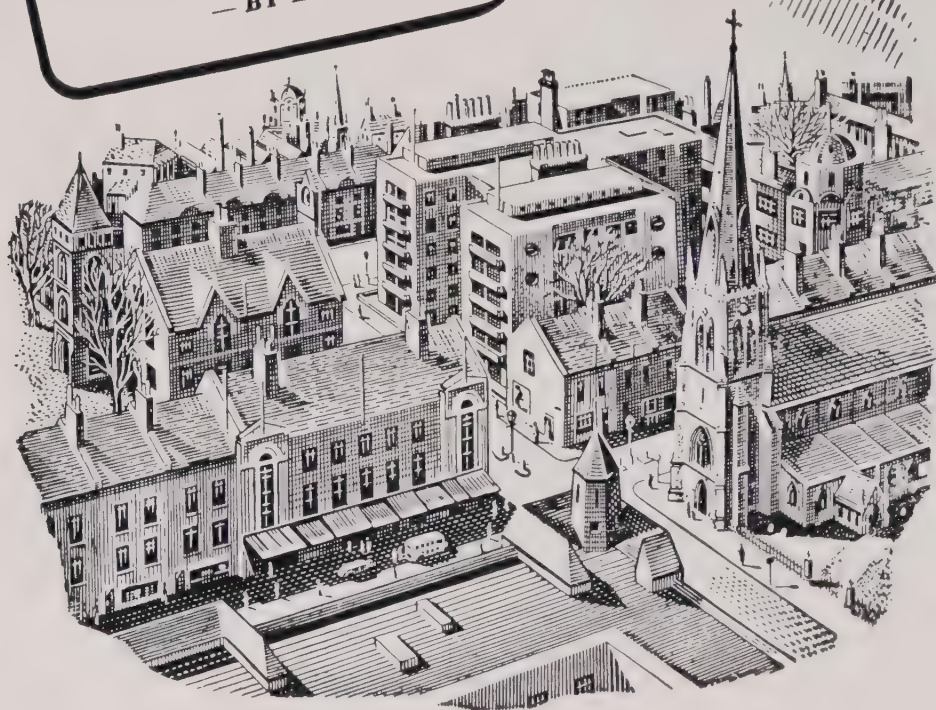
September 28th, 29th, 30th

SMOKELESS AIR. Vol. XIX, No. 69, Spring, 1949. Published quarterly by the Society at the above address (editorial and advertising).

Gratis to members and representatives of members. Subscription rate : 2s. 6d. per annum, post free.

Smokeless Air is the official organ of the Society, but the views expressed in contributed articles are not necessarily endorsed by the Society. Abstraction and quotation of matter are permitted, except where stated, provided the usual acknowledgments, including the name and address of the Society, are made.

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*Ships, towers, domes, theatres and temples lie
Open unto the fields, and to the sky ;
All bright and glittering in the smokeless air.*

SMOKELESS AIR

What Others Say

ONE of the most interesting aspects of working on smoke prevention and in particular producing this journal, is noting and assessing what others are thinking and saying about our problem. Not only do such observations give us some idea of the state of what is called public opinion, but they enable the Society's own attitude to be adapted and developed, perhaps insensibly, according to the feeling of things outside the circle of our own friends and associates. Sometimes what is said or written is encouraging because it commends the Society's actions or confirms its arguments ; sometimes it stimulates because it is harmfully wrong or even silly ; and sometimes it is helpful because it is in advance of our own ideas. In these days there is such a spate of material of all kinds flowing in and demanding study, action, or comment, that it becomes difficult to sift and record it all.

It may be of interest to our members

to pass on to them a few of the things that have interested us during the past few weeks. First, perhaps, is the marked contrast of public concern as between the fatal smoke fogs last autumn in Donora, U.S.A. and London, England. Donora, where the fog was unusual, gained the headlines throughout the world's Press. London's fog deaths, which followed a more familiar pattern, received only an article in the *Lancet*, a news paragraph in the *Times*, and a single leading article, which was in the *Evening Standard*.

Under the title "300 Died in a Week" this last began : "In the last week of November, 1948, there was a full scale massacre in London. Hundreds were murdered here ; many more died in the provinces. The criminal has not been caught, though he has killed many thousands in his time, and is killing yet. He is not easy to catch, for he is vaporous, amorphous and elusive. His name is smoke, the deadly ingredient of fog."

After outlining the problem and

giving weight to the importance of domestic smoke, the article concludes : "An increasing use of smokeless fuels, such as gas, coke and anthracite, would reduce the menace to health, but, at the same time, would remove much of the charm from our rooms. It may be that the public will have to be prepared to compromise. It is urgently necessary that the Government should establish smokeless zones in our major cities. To do so is an essential act of surgery. At present it is a choice between Hearth and Home."

We agree about the surgery, if not about the charm. A smokeless fuel fire can be every bit as charming as a coal fire, and many even like its greater cleanliness.

But after this we come to the view that this is no time for smoke-abolishing surgery. The *Bradford Telegraph*, commenting on the fog, adopts a minatory attitude : "Like the smoke abatement enthusiasts we would like to see clean buildings, clean streets. We would like to breathe the purest air. But we do not take so serious a view of the matter as they. The one thing we do take a serious view of is the fact that the country is not paying its way, and, unless it increases its efforts in production, may still not be paying its way when Marshall Aid ceases."

This is to say that we cannot afford to stop wasting the not inconsiderable effort in production represented by the ten million tons of coal that are lost as and with smoke every year. Nor can we afford to take steps to transfer the material and labour now being used to combat the effects of smoke to the tasks of positive production. Smoke, in fact, is a major saboteur of our production effort.

After this buffet from Yorkshire our confidence is restored by a leading article in the *Manchester Guardian* on the "Pittsburgh Fights Smog" article that appeared in the last issue of SMOKELESS AIR. That article created a great deal of interest and was quoted in a number of papers, but the *Guardian*, as so often, gave the best summing up of the matter : "Pittsburgh's experience shows that smoke abatement

cannot be brought about without drastic measures painstakingly enforced. But it shows that it can be done. It is simply a matter of courage and taking trouble."

Looking across the Atlantic again we must salute the *Woman's Home Companion*, the famous U.S. magazine, not just for publishing in its February issue a vivid and hard-hitting article on smoke and its prevention, but for taking a whole page in the *New York Herald Tribune* (and perhaps in papers we have not seen) under the title of "Smoke, the Silent Murderer." The *Companion* offers to supply reprints of either article or advertisement to those who can use them. How much would we like to see a woman's magazine in this country taking up the cudgels like this ! The question is, alas, rarely mentioned in their pages. Does the difference in the estimation of public, or feminine, interest arise because public opinion in the U.S. is in advance of ours, or because smoke is worse there—or because editorial boards are of a different quality ?

Finally, we like what is said in two reviews that have come in as these paragraphs are being written. The *Architect and Building News* in an editorial entitled "Fouling our own Nest" commends the Society's *Proceedings of the Cheltenham Conference* as being full of valuable information, and prefaces its comments with this excellent note on colour :

"The struggle between colour and dirt which goes on in all large towns is so one-sided, that when one reads that railway coaches and locomotives are to be tricked out in toy-shop colours, no great enthusiasm is roused, only respect for the lion-hearted people who refuse to give up and join the ranks of the grainers and dried-blood and umber school of thought.

"The important thing is to keep a tradition alive by such brave gestures as that of the British Railways. It takes its place with the pots of geraniums, brightly-coloured front doors, and the light and gay clothes that spend half their time at the cleaners, as a symbol of what life will become when the dirt

ages are over."

And, ends the *Architect* on a neatly witty line, "thanks to bodies like the National Smoke Abatement Society, D.S.I.R., Fuel Research Station, etc., a process of education is going on which should yield results in the distant but not so dim future."

Equally helpful is a review headed simply "Vis" in *Aeronautics*, from which we quote the beginning and the end:

"It is regrettable but a fact that all the propaganda poured out in favour of the industrial civilization; of busy factories and of multitudes of factory workers, fails to conceal the truth, which is that the factory community is largely destructivist and that it has nothing to recommend and little to excuse it. Only one of its pernicious products is smoke, the subject of this small but admirable book [*Guilty Chimneys*] . . . All those who are interested in the advance of aviation must be wholeheartedly in support of the campaign being conducted by the National Smoke Abatement Society. We recommend this book to everybody who wants to see flying made safer and the amenities of existence improved."

Focus on Smoke

Or what others say. We hope that many of our members listened to the discussion broadcast on Tuesday, March 1st, in the Light Programme. It was lively, telling, and to the point in the facts it presented, most of which would have been familiar to members of the Society. Altogether, from our point of view, it was first-class propaganda, and we hope the B.B.C. find that it created interest and decide that it should be followed up by more talks and debates—there is ample interesting material available. The speakers were well-contrasted and were convincingly interested in what they had to say and in their reactions to what was said to them, even though—as is so often the case in these purposely spirited discussions—they were apt at times to seem rather unnecessarily irritated with each other.

Our New Divisional Councils

A meeting attended by over a hundred of the Society's members and representatives in the North-East Division (Northumberland, Durham and the Cleveland area of Yorkshire) was held in Newcastle-upon-Tyne on February 8th. The meeting, opened by the Lord Mayor of Newcastle, was presided over by Alderman Chapman of Newcastle, and was addressed by him, Mr. Charles Gandy, Alderman Hancock of Gateshead, and the General Secretary. There was a full and enthusiastic discussion and a motion to set up a Divisional Council was carried unanimously. Mr. W. Gray, Chief Sanitary Inspector of Newcastle, was elected Hon. Secretary, and a provisional Committee to draft a constitution was appointed.

Next, on April 7th, a similar meeting will be held in Nottingham to consider setting up a Divisional Council for the East Midlands. This is a large area, which includes not only the more midland counties but the whole of East Anglia, where smoke is less serious and membership is so far rather thin. But interest from the industrialized districts is encouraging.

Mr. Alfred Wade

One of those most keenly interested in the proposed East Midlands Council is Mr. Alfred Wade, Chief Sanitary Inspector of Nottingham, and a member of the Society's national Executive Council. We should like to record and to take this opportunity of congratulating him on the award, for Public Service, of the M.B.E. to him in the New Year's Honours List.

Frontispiece Picture

The "smokeless air" photograph on our first editorial page is also an illustration to the "Electricity from Water Power" article on page 38. It shows Cullipool, Island of Luing, looking towards Easdale and the hills of Mull. These islands will be supplied by a small hydro-electric distribution scheme which will serve five villages and provide power for development of the slate quarry industry of the area.

Rochdale's Smokeless Zone

Planned for 1953

THE Lancashire cotton town of Rochdale has a character and distinction of its own. It is an ancient, proud and friendly town, and is pleasant in spite of the atmosphere and other consequences of nineteenth century industrialization and growth that it shares with its neighbours. Its people give the impression of being soundly practical and of liking to "get on with it," and it was in Rochdale, over a century ago, that the now world-wide co-operative movement was first started. To-day, what is really a new kind of co-operation, that of refraining from harming each other with smoke pollution, looks as if its birthplace is in the same town.

Rochdale is in fact a little sensitive about its smoke. It is certainly smoky, but no more so than any other town of similar size and conditions. But it happens to be the home town of a distinguished worker and author in the scientific field of experiment and observation on atmospheric pollution. For many years, therefore, some of the most interesting facts and figures about the incidence and behaviour of smoke, or the loss of sunlight it causes, have been related to Rochdale, and for want of records from elsewhere, the finger of the smoke abatement propagandist has frequently pointed to Rochdale. From time to time there have been signs of umbrage being taken, and it is possible that this feeling has done something to make the town keen to create what may well be Britain's first declared smokeless central area.

The Rochdale Corporation Act, 1948

Among many other things this Act gave the Corporation powers (Section 51) to prohibit the emission of smoke from the central area of the borough, and by extension any other area or areas. The Council has stated that it intends to bring the provisions into force, with respect to the central area, by 1953, and has sent an explanatory

letter to all owners and occupiers concerned.

The Act requires twelve months' notice to be given by the Council before the provisions of Section 51 can be brought into operation, and, to quote from the letter, "the Council think it right that you should have early knowledge of the Council's intentions and, therefore, asked me to inform you that as soon as the Council feel that sufficient labour and materials are available to enable smokeless fuel burning apparatus to be installed throughout the Central Area they will pass a formal resolution bringing Section 51 into force and will then give twelve months' notice of this resolution. . . . They intend that the Section shall be brought into operation at some time within the next five years and they wish owners and occupiers to be informed of this so that, if anyone contemplates alterations to his fireplaces, etc., within the next few years, he can instal apparatus capable of burning smokeless fuel and thus avoid additional expense when the provisions of the Section come into force."

The Act says that subject to the provisions of the Section, "no smoke shall as from the commencement of this section be emitted from any premises in the central area." The definition of smoke is interesting and should be carefully noted: it includes "soot ash grit and gritty particles but shall not include smoke emitted when coke anthracite or any other fuel of a type specified by the Corporation is used in a furnace stove or other appliance which is suitable for burning such fuel and is properly maintained and used."

The exemptions, or possible exemptions, provided for are serious. Any specific premises may be excluded from the area, or the application of the order to any premises may be deferred for a specified period. The customary deferment clause for mining and metallurgical processes is included and refers

also to "an electricity generating station of the authority," and a further clause gives complete exemption to railway locomotives.

The Corporation is given powers to "contribute the whole or part of the expense necessarily incurred by any person in executing works" or making alterations for the purpose of complying with the section or order.

The Central Area

The first smokeless zone, as stated, will be the central area. This is not large but it is most important. It includes the Town Hall and administrative centre of the town, covers $67\frac{1}{4}$ acres, and contains 323 different premises made up as follows :

Dwelling houses	...	24
Offices	... ..	104
Shops	... ..	110
Cafes, hotels, etc.	...	26
Places of entertainment	...	7
Churches, clubs, halls, etc.	...	16
Workshops, garages, etc.	...	20
Miscellaneous	... ..	15
Large-size industrial premises	... ..	1

The appliances used for space and water heating and for cooking in these premises total 1,349, of which 784 use gas or electricity and are therefore already smokeless ; 169 are open fires not ordinarily used, and 78 use coke, anthracite or oil. There are 316 open fires using coal in fireplaces, of which it is said the majority could use fuels of the "coalite" type ; 28 are in dwelling-houses to be demolished in the near future.

There are two coal-fired heating plants. The larger belongs to a private firm which was the subject of an undertaking given outside the Bill exempting it for five years ; the other provides heating for the Corporation Market and the Markets Department have given the necessary agreement to the alteration of this plant to the burning of smokeless fuel as soon as required.

Extending the Zone

Plans are not yet detailed for further smokeless zones, but it is not intended to rest content with the first central

zone. Because it is of relatively small size it is appreciated that in itself it can make only a small immediate contribution to smoke diminution, but that its propaganda value will be important and that it will make the best possible beginning for the task of creating a smokeless Rochdale.

It is, however, probable that new housing areas of the "neighbourhood" type (which will now be fitted with appliances suitable for smokeless fuels) will before long be automatically declared to be smokeless zones. Extensions may also be made to the initial zone.

To quote the Medical Officer of Health, Dr. John Innes : "It is also realized that since Rochdale is only one unit in a large belt of smoke-producing towns, little can be achieved in cleansing the air without the co-operation of other towns. Equally, however, nothing would ever be achieved by each town waiting for its neighbours to take the initiative."

We hope that this will be noted by Rochdale's neighbours, and that they too will begin to consider the creation of smokeless zones. Manchester was the first town to secure smokeless zone powers, and in our last issue we reported on the action being taken by Salford to create five smokeless zones in its new housing estates. Progress seems to be focussed in south-east Lancashire, and looking well ahead one wonders if this might become Britain's first smokeless *region*.

St. Helens

St. Helens, Lancs., Public Health Committee has initiated a Joint Consultative Committee for Smoke Abatement, on lines similar to that formed recently at Widnes. The Committee will include representatives of the Public Health and Housing Committees, the Whiston R.D.C., National Coal Board, Gas and Electricity Industries, Manufacturers and the Alkali Inspector of the Ministry of Health.

Electricity from Water Power

Progress in Scotland and Wales

TO all those interested in the abolition of atmospheric pollution, the development of electricity supply—the source of so much smokeless power and heat—is always welcome. When, however, electricity is produced without making inroads on our vanishing reserves of coal—and is moreover unaccompanied by the emission locally of grit which is unfortunately sometimes associated with some of our older power stations—it is received with an even greater enthusiasm.

For many years our supplies of coal have been plentiful and cheap and they have been used up with reckless prodigality. Now that the more easily-won coal has been exhausted, and various factors have operated to increase the price of coal, attention is being directed more than ever before to the most efficient means of using our coal or to finding and exploiting alternative sources of power. In countries not so blessed as we have been with supplies of coal, this research began many years ago and in Scandinavia, Italy, Switzerland, etc., hydro-electric power has been extensively developed.

In Britain such water-power resources as we possess, until recent years, have attracted but scant attention. In 1919 and 1921 committees were appointed by the Board of Trade to report on the water power resources of the United Kingdom, and shortly afterwards another committee was appointed to consider the possibility of utilizing the high tides of the Severn estuary for the production of electricity. These reports were not, however, followed by any extensive development.

The earliest hydro-electric plant of any size was constructed by the British Aluminium Co. at Foyers on the south shore of Loch Ness in 1896, to be followed by a second plant at Kinlochleven some thirteen years later. About

1924 the same company established its larger Lochaber Power Scheme with its power station at Fort William.

Progress was arrested during the first world war, but in Wales in the early 1920's the North Wales Power Company inaugurated its power stations at Dalgarrog and Maentwrog, but in Scotland bills promoted in 1928 and 1929 to develop schemes in Loch Quoich and Glen Affric were thrown out by Parliament, which, however, did approve the Lanarkshire Company's scheme on the Clyde, the Grampian Company's scheme in 1930, and the Galloway scheme which came into operation in 1935-37.

Further progress in Scotland, the Caledonian power scheme and the Grampian Company's scheme in Glen Affric, failed to receive parliamentary sanction, and later a committee, under the chairmanship of Lord Cooper, was set up by the Secretary of State for Scotland to consider and report upon the desirability and practicability of hydro-electric development in Scotland. **The North of Scotland Hydro-Electric Board**

The recommendations of this committee were implemented by the Hydro-Electric Development (Scotland) Act, 1943, which set up the North of Scotland Hydro-electric Board, a non-profitmaking corporation with a State guarantee, to develop the water power resources of a part of Scotland north of a line from the Firth of Clyde to the Firth of Tay, having an area of about 21,000 square miles, and a population of about one and a half million.

The Electricity Act of 1947 vested in the British Electricity Authority 568 electricity undertakings, but has left the Scottish Hydro-electric Board in a unique position with autonomous powers owning the grid and the generating stations within its own territory. It also has the right to export

to the British Electricity Authority bulk supplies at a price corresponding to the cost of generation at the most efficient coal-burning generating station in Great Britain.

The welcome accorded to the North of Scotland Bill under the stress of war was in marked contrast to the attitude of Parliament between the wars, and progress under the Board has been rapid. In 1944 the Board published its development scheme including 102 potential hydro-electric generating projects with an annual output of six and a quarter million units or about a seventh of the electrical energy generated in Britain.

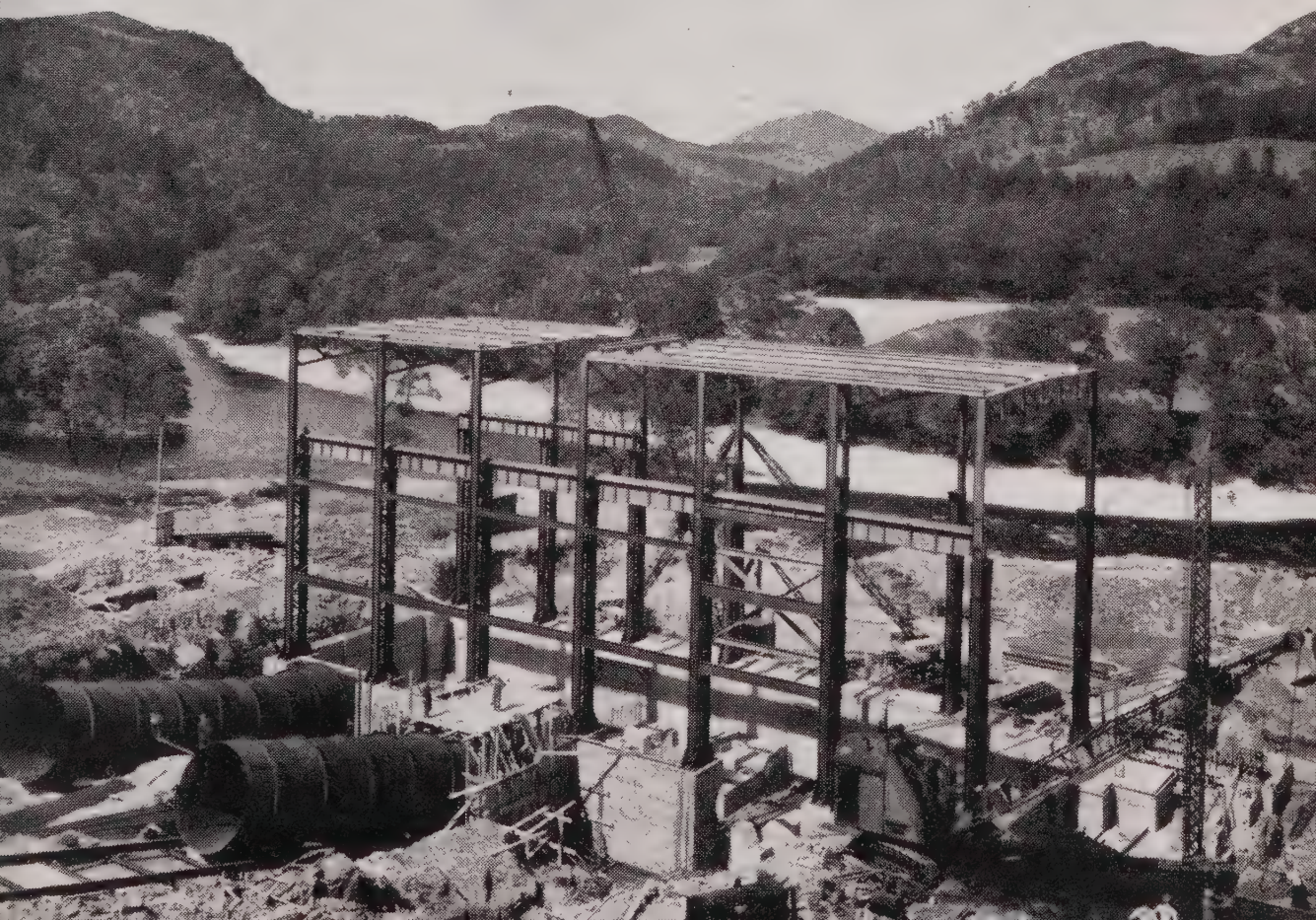
The admirably produced report of the Board for 1947 shows that extensive progress has been made. Some eighteen constructional schemes are on foot with operating heads varying from 1,360 ft. at Lawers in Perthshire, 965 ft. at Glen Shira (lower) on Loch Fyne and 910 ft. at Sloy on the banks of Loch Lomond, to 16 ft. at Loch

Morar on the west coast of Inverness-shire. The turbine sets vary in output from 40,000 kw. at Shira (lower) and 32,500 kw. at Sloy, illustrated, to 200 kw. at Gairloch on the west coast of Ross.

The Tummel-Garry scheme in Perthshire is an extension of the Grampian Company's plant and involves the installation of three 19,000 kw. vertical sets operating on a head of 173 ft. The illustration is a view looking north, showing the power station in course of construction. The total output of all the hydro-electric plant at present projected by the Board will approximate to half a million kilowatts to distribute which some 320 miles of 132 kv. transmission lines have been projected. The expenditure involved is of the order of twenty-one million pounds.

The first two schemes to come into operation, those at Loch Morar and at Lochalsh, Ross-shire, were started up in December, 1948. The first is of interest in that the generating station is entirely underground, excavated from rock beside the River Morar. The generating

*The Tummel-Garry Project.
Clunie Power Station, looking North.*



station at Lochalsh is built of hammer-dressed stone and it is of interest to note that the masons who accomplished this had not worked at their craft for many years and were specially assembled for this undertaking.

Amenities Safeguarded

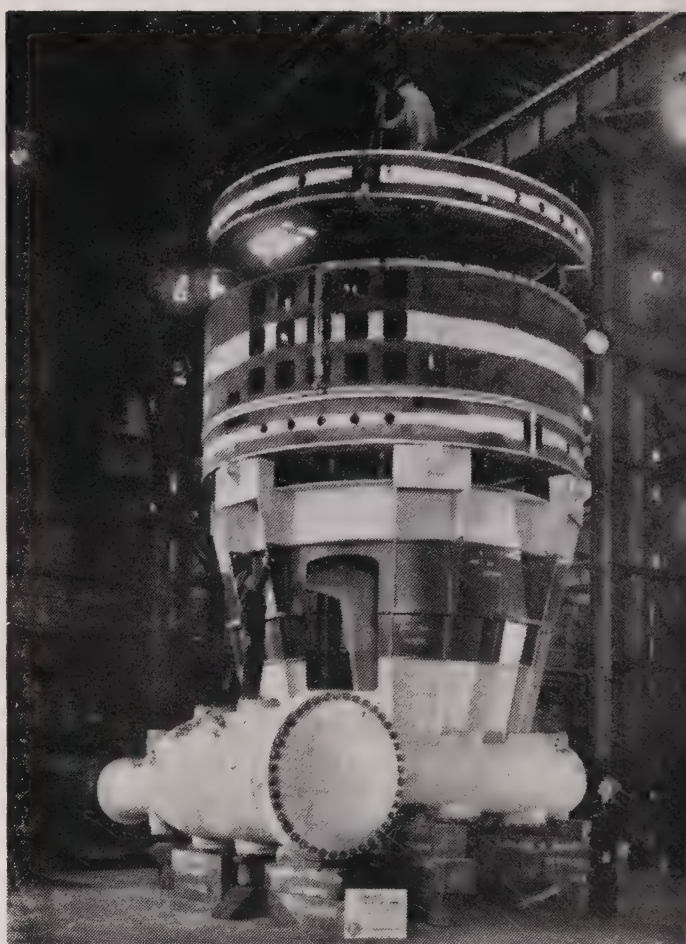
The Act establishing the Board provides that in the exercise of their functions, the Board shall have regard to the desirability of preserving the beauty of the scenery and any object of architectural or historic interest, and of avoiding injury to fisheries and to this end it provides for the setting up of an Amenity and a Fishery Committee to which all schemes must be submitted.

In addition to the works that it has itself projected, the Board has acquired under the Act of 1947, the 84,500 kw. hydro-electric plant of the Grampian Company, 130,000 kw. of steam plant at Aberdeen and Dundee, and 26 Diesel plants serving isolated areas and having a combined capacity of 23,000 kw. and Diesel plant of about a similar capacity is being installed. The Board is also installing at Dundee a 15,000 kw. Escher Wyss gas turbine set, which is being constructed at the Clydebank works of John Brown & Co.

It has been the policy of the Board to develop the building of turbines, alternators, overhead cable ways, transformers, sluice gates, switch gear, etc., in Scotland and many firms in Glasgow, Dundee and Aberdeen are engaged in this work.

It is anticipated that the work undertaken by the Board will provide electricity for domestic, agricultural and industrial purposes, etc., in the Highlands and thereby tend to arrest the depopulation that has been in progress for two centuries, for industries requiring large quantities of electric power such as aluminium and magnesium production, and provide a surplus for sale to the British Electricity Authority.

Concurrently with these activities in Scotland, the British Electricity Authority has extensive schemes on foot in Wales designed to increase the hydro-electric output to 625 million units a year. These involve the extension of the Dalgarrog and Maentwrog plants



Loch Sloy : Turbo-alternator Assembly

and the building of new plants in the neighbourhood of the Conway, of Snowdon, and Plynlimon.

It is very gratifying to see this development of our natural resources that have been so long neglected. It would be even more reassuring if the high tides of the Severn estuary could be harnessed for the production of electricity. Although a committee reported favourably in 1933 on this project and their findings received endorsement twelve years later,* nothing has so far materialized, and it must be appreciated that this scheme offers unusual difficulties due to the high tides moving round the clock, and necessitating the establishment of alternative plant somewhere to take the load when the high tide is out of phase with demands for electricity.

* Report of the Severn Barrage Committee, 1933; reprinted 1945; Report on the Severn Barrage Scheme, 1945, Ministry of Fuel and Power, 1945. H.M. Stationery Office, 2s. 6d. each.

A Pioneer Passes

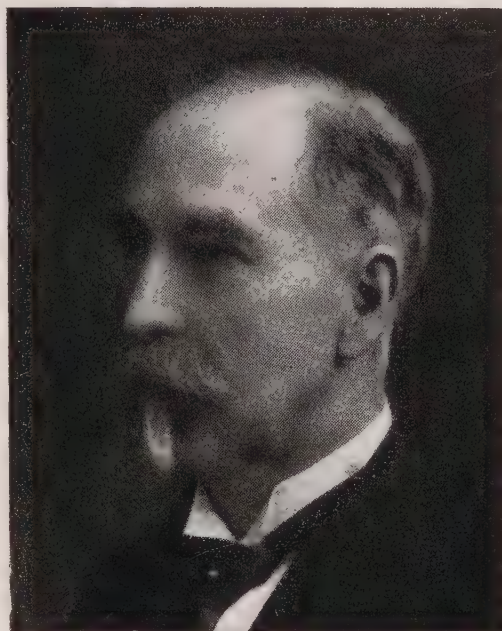
**An Appreciation of the late W. Brownhill Smith,
by Allan W. Ritchie, President, Scottish Division**

BY the death at the age of 85 of ex-Bailie W. Brownhill Smith, M.V.O., O.B.E., D.L., J.P., in Glasgow on December 27th, 1948, a stalwart in the smoke abatement movement has been removed.

Educated at the High School of Glasgow and at Anderson's College where he specialized in chemistry and electricity he followed the business of his father and grandfather as a jeweller and silversmith.

Mr. Smith was a member of Glasgow Corporation for 30 years and held various important posts including that of Chairman of the Public Health Committee. He served for five years as a magistrate and was senior magistrate in the last year of his term. He was best known, however, as a powerful advocate of smoke abatement and entered the Corporation in 1906 with the express purpose of getting a better atmosphere for the citizens. In the movement he was a leader, not only in Glasgow, but throughout the United Kingdom, and his reputation went even further afield.

He was one of the founder members of the Scottish Division of the Society known at that time as the Smoke Abatement League of Great Britain. His name appears, as chairman, in the first recorded Minute of the Society on February 16th, 1910, and he continued in the office of Acting Vice-President (the Lord Provost for the time being acting as Hon. President) until 1939 when he completely retired from public life, having previously retired from membership of Glasgow Corporation. He played a very active part in furthering the aims of the Society, delivering lectures with the aid of a fine collection of lantern slides, and generally bringing to the notice of the public the work of the Society in preventing pollution of the atmosphere.



As a member of Council of the Royal Sanitary Association of Scotland, Bailie Smith took every opportunity at Conferences to refer to the effect on health of a smoke polluted atmosphere and it was not the least surprising that for his Presidential Address in the year 1933 he dealt very fully with that topic under the title of "Life and Death in the Air." He often emphasized the vast possibilities of the extended use of electricity, gas and smokeless fuel, and urged the development of the low temperature carbonization of coal.

Mr. Smith was one of a committee appointed by an International Conference on Smoke Abatement before the first war, and he was chosen to represent Great Britain at a conference held at Pittsburgh. He was mainly responsible for the improvements which were gradually introduced in Glasgow, particularly in the Gas and Electricity Departments, and it was a tribute to his zeal for reform that he was appointed a member of a Departmental

(concluded page 43)

FOG AND MORTALITY

W. P. D. Logan

M.D., B.SC. GLASG., D.P.H.

ASSISTANT MEDICAL STATISTICIAN, GENERAL REGISTER
OFFICE, W.C.2.

(Reprinted from "The Lancet" by kind permission of the Editor and Author.)

5th Jan. 1949, 1, 78.

THE dense fog that enveloped London and much of the country during the closing days of November, 1948, established a record, not for density but for duration. Commencing in London on the night of Friday, November 26th, it persisted until Wednesday, December 1st. The disruption of transport that it occasioned received ample comment in the press ; but less mention was made of the toll in life that it might be exacting.

The fog occurred mainly during the first half of the week ended December 4th, the forty-eighth week of the year. The total weekly deaths from all causes registered in London during weeks 44-51 of 1948 and of the three previous years are shown in Table I.* The sharp rise in deaths registered during the week of fog stands out clearly, 20 to 30 per cent. more deaths being recorded in that week than in each of the four previous weeks. The effect continued into the forty-ninth and perhaps the fiftieth week of the year.

Table II shows the number of deaths

ascribed to various causes during these eight weeks. As was to be expected, much of the increased mortality was due to respiratory infection. Registered deaths due to bronchitis and to pneumonia more than doubled during the forty-eighth week, deaths from most other causes being little if any higher than in the previous four weeks. There was, however, some increase in deaths from myocardial degeneration and cancer.

The ages at which bronchitis and pneumonia caused death are shown in Tables III and IV. During the fog week there was no increased mortality from either disease at ages under 45. The increase was numerically greater above the age of 65 but proportionately greater in the 45-64 age-group. In the next two weeks (49 and 50) bronchitis deaths returned practically to their normal level, but not so the deaths due to pneumonia especially among the elderly. The registered mortality from pneumonia in infancy was not increased during the week of fog but rose to a high level in the following week.

TABLE I.—Deaths registered in London (Administrative County) during weeks 44-51

Year	Week No.							
	44	45	46	47	48	49	50	51
1945	593	639	638	707	739	731	907	979
1946	654	742	780	753	778	727	887	945
1947	730	771	742	799	721	861	817	779
1948	811	801	846	779	1,019	944	891	738

* The figures in this and subsequent tables are taken from the Registrar-General's weekly return.

TABLE II.—Deaths from selected causes registered in London (Administrative County) during weeks 44-51 of 1948

Cause	Week No.							
	44	45	46	47	48	49	50	51
Respiratory tuberculosis ...	33	36	44	36	46	45	37	34
Influenza	1	2	3	2	3	4	2	2
Bronchitis	63	57	68	73	148	103	88	55
Pneumonia	32	42	46	29	73	71	67	51
Road traffic accidents ...	5	8	9	3	9	6	2	4
Old age	8	7	7	8	5	13	9	8
Myocardial degeneration ...	95	97	125	102	133	135	103	79
Cancer of respiratory system	35	43	30	31	42	34	20	20
Cancer of other sites ...	135	119	135	118	148	115	146	123

TABLE III.—Deaths from Bronchitis at various ages, registered in London (Administrative County) during weeks 44-51 of 1948

Age (years)	Week No.							
	44	45	46	47	48	49	50	51
<1	2	—	4	—	2	4	7	1
1-14	2	—	—	—	2	1	1	—
15-44	—	2	1	6	4	5	4	4
45-64	11	11	13	8	32	19	20	8
65+	48	44	50	59	108	74	56	45

TABLE IV.—Deaths from Pneumonia (all forms) at various ages, registered in London (Administrative County) during weeks 44-51 of 1948

<1	7	4	12	4	6	19	12	13
1-14	1	—	2	3	2	4	4	1
15-44	—	—	2	1	5	—	1	—
45-64	6	8	6	4	19	11	11	9
65+	18	30	24	17	41	37	39	28

A Pioneer Passes—*contd. from page 41*
Committee to advise the Board of Trade on the improvement of electrical supplies.
Bailie Smith also took a leading part in getting a section of British Industries Fair for Glasgow and the building of the first Kelvin Hall where many trade fairs and exhibitions have been held, and was sub-convenor of the Ethnographical and Historical Committee of the 1911 Glasgow Exhibition and a Fellow of the Society of Antiquaries in

Scotland.
His chief interest, however, always lay in the field of smoke abatement in which he was wholeheartedly enthusiastic. He seemed to regard its advocacy as a mission which demanded his constant and complete service. He undoubtedly played a big part in all that the Society has attained in the last 40 years.
Mrs. Smith, who survives her husband, has also taken a very keen interest in the movement.

Correspondence

STEELWORKS SMOKE : PREVENTION BETTER THAN CURE

*The Editor,
Smokeless Air.*

Sir,

More than ever before industry is striving to improve amenities and general working conditions with the object of making life within the factory as congenial as possible. As a corollary it is important to reduce the effects of atmospheric pollution since this has its dismal influence on the life of the work-people both inside and outside the factory, and on the community at large.

Much more can be done to reduce both domestic and industrial pollution, but there is in both cases a legacy from the past which makes many all-embracing measures an economic impossibility. It should therefore be the endeavour to avoid perpetuating the smoke and dust nuisance in the case of all new construction.

In industry, the most obvious atmospheric pollution frequently comes from those items of plant which are ob-

solescent, and although some inexpensive palliative may bring about their improvement, it may in fact be wiser to spend money on the proper equipment of new plant which has a long life ahead of it.

It may interest you to know that reasoning in this way The United Steel Companies have adopted a ruling that applications for capital expenditure *on plant which may create atmospheric pollution* must be accompanied by a memorandum setting out the measures available for avoiding or reducing its effects, and the cost of such measures. In this way it is hoped to reduce the risk of this important consideration going by default and to lend support to the management and technical staffs who have this matter very much at heart.

Yours, etc.,

F. H. SANITER,
Director of Research.

*United Steel Companies, Ltd.
Sheffield.*

EDUCATION FOR INDUSTRIAL SMOKE PREVENTION

*The Editor,
Smokeless Air.*

Sir,

As my main interest lies in fuel economy and education of boilerhouse operatives, your article entitled "Education for Industrial Smoke Prevention" (SMOKELESS AIR, Autumn-Winter 1948) has caused me to ponder over this controversial subject once again. From my own experience in this field I would point out that there exists to-day two views diametrically opposed: (1) the employers and managements in general, whose argument is that if by higher qualifications and technical knowledge these operatives are likely to demand the wages paid to other skilled tradesmen, then by no means should

the scheme be promoted; (2) fuel technologists, engineers, Trades Union leaders, and a great many of the young operatives themselves wish to raise the whole standard of the boiler fireman. The reasons may differ in detail, but in one essential we agree—a skilled job can only be carried out by a man who is mentally alert. Gone are the days of all brawn and no brain. The Regional Offices of the Ministry of Fuel and Power are doing a truly wonderful job of work in organizing lectures, courses, etc., in Boilerhouse Practice, but in the face of all this I myself have been asked more than once by young boiler firemen "What is the incentive to give up our evenings? Will we receive a better wage if we pass the necessary examinations? What is the use of my learning

to save coal when my mate wastes twice as much?"

I will now go a step further and analyse the case of a young operative who is keen to better himself. His ultimate goal is Corporate Membership of the Institute of Fuel. He will, unless a very exceptional man, spend five winter sessions, which we may count as five years, working up to and gaining the City and Guilds Advanced Certificate in Boilerhouse Practice. This operative has received a normal elementary school education.

His next step is to gain exemption from Section A of the Institute of Fuel Education Syllabus. The easiest method would appear to be taking the three-year course (Evening Classes) for the Ordinary National Certificate in Mechanical Engineering. This entails delving into all kinds of subjects completely foreign to him. Finally, he settles down to studying for Section B of the Institute's Syllabus. He will also be attending lectures in such subjects as Applied Chemistry and Physics, and this will occupy a further two or three years. In order to achieve this success the man (I almost wrote "hero"!) will have spent at least ten successive winters studying. Thus to me at least one sentence in your article is rather mis-

leading, for not only must a boilerhouse operative be "keen," but intellectual as well.

So far as the R.S.I. examinations are concerned, I have only one comment to add. The Smoke Inspectors examinations are too highly specialized, and answers to questions cannot in many instances be evolved from first principles. For instance, a question asked in one paper last year required a thorough knowledge of a Committee Report on the heating of dwelling houses. Surely such a question is far removed from the normal duties of a Smoke Inspector.

In general, it is my contention that education in fuel technology and kindred subjects is defeating its own ends by straying far from first principles, and is becoming entangled in a web of high specialization.

I make no apology for the length of this letter, because while I welcome higher and wider education in fuel technology, fuel economy and smoke prevention, I am positive that the whole question should be gone into in the light of everyday difficulties such as I have outlined on previous pages.

Yours etc.,

EDWARD C. REEDER.

Shipley, Yorks.

THE NORTH-WEST DIVISION

A joint meeting of the Division, the North West branch of the Institute of Municipal Engineers, and the Manchester Society of Architects was held in Manchester on January 28th.

In a paper on the heating requirements of the average household, Dr. J. L. Burn, the Medical Officer for Salford, said he was somewhat alarmed about the effect of unheated bedrooms on health. Sudden chilling on rising and retiring might be responsible for much illness, especially among older people. "The opinion is held in some quarters that sinus trouble is due to sleeping in unheated bedrooms," he added.

Mr. F. Leslie Halliday, of the Manchester Society of Architects, con-

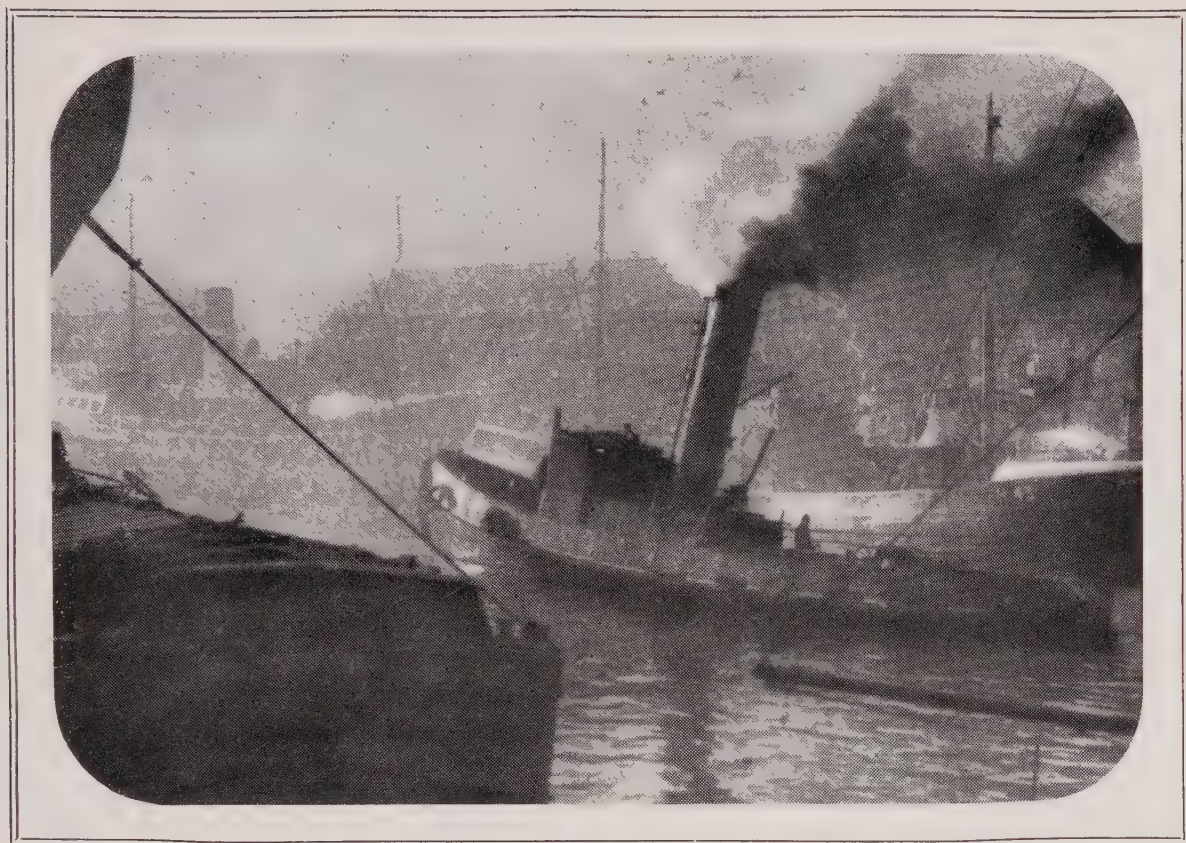
sidered the problem from the point of view of house design. Our bedrooms were usually so uncomfortable that we used them only for sleeping and for hurried dressing and undressing. Adequate central heating made these rooms available as additional living space for such semi-private purposes as study.

Mr. Arthur Hamilton, Borough Surveyor for Blackpool, gave a paper on the heating of bedrooms. He said that in the Building Research Station's experiments the houses with appliances giving convected hot air to the bedroom did not come out particularly well. He disagreed with the theory that back-ground heating with "topping up" from gas or electricity was the best aim. He argued that it cost little more to install and run a full single-stage heating system, and that we should "go the whole hog."

News in Brief

AN unusual sidelight on the effects of the fogs in London last November comes in information about the deaths of goldfish in ponds in the open air. The fog had left an oily film on the surface of the water and apparently this either poisoned the water or prevented its oxygenation. Some of the fish, found feebly struggling on the surface of the water, were placed in clean water, revived, and are still alive. Can any naturalist members supply information about similar occurrences? ★ Salford Health Committee, planning on the assumption that the first series of the city's proposed smokeless zones will be made operative in 1950, has authorized the purchase of apparatus for making atmospheric pollution records in the five areas. See the article in our last issue. ★ The *Southend Times*, reporting that the Council had agreed to renew its subscription of ten guineas to the National Smoke Abatement Society, records that one councillor objected, and that the reply of the mayor to this was "It would be worth 20 guineas." ★ Coventry's Planning and Redevelopment Committee has decided that it would not be justified at this stage in recommending the city council to proceed with a scheme for district heating in the central area. However, the Committee is anxious to ensure that its decision does not close the door on the possible introduction of a district heating scheme, as it believes that research into new methods of heating may lead to surprising results in the relatively near future. ★ "There is no more serious environmental problem than smoke pollution," said Dr. Gallo-way, Bolton Medical Officer of Health, addressing a conference of school-teachers in Manchester. Mortality rates from bronchitis and pneumonia were nearly twice as high in Manchester or Bolton as in clean atmosphere towns such as Oxford or Norwich, he said. There was no more wanton destruction

of life, of coal, and of sunlight than smoke pollution, which would only be prevented when public opinion demanded efficient measures. ★ "Open coal fires in the home have at the most another generation to live after the present one," said Mr. J. Nelson Meredith, City Architect, at a domestic heating conference in Bristol. He stressed the wastefulness of smoke and paid tribute to the Lord Mayor and the Housing, Planning and Health Committees towards their work towards securing smokeless zones in the city. ★ The new Los Angeles Atmospheric Pollution Control is taking unusual measures against smoke and fumes from diesel-driven vehicles. Special mobile squads, known as the "Diesel Patrol," roam the main commercial arteries in cars. Each man carries a Ringelmann smoke chart printed in circular form with a central hole through which the exhaust smoke is observed and its density noted. Offending vehicles are stopped and, in the first instance, formal warning is given. Later action may include sending a questionnaire to the owner of the vehicle, bringing him before a special "Panel" or finally, in a very few cases, taking the case to court, where fines range from 3 to 100 dollars. ★ On February 4th, Leicester experienced what the evening paper called "the great sootflakes mystery." All round the centre of the city, it was said, "shopkeepers and street cleansing department employees were sweeping up soot by the bucketful . . . the covering on roofs, pavements and shop window ledges was as noticeably black as a light snowfall would have been white." Investigations failed to reveal any special occurrence to account for the phenomenon. Mr. F. G. McHugh, Chief Sanitary Inspector, thought it was likely to be due to an inversion layer of cold air over the city, shutting down on the soot and preventing its normal dispersal. ★ The Woman's Advisory



From Our Photo Library—1

W. Jackson

Smoke in the Fish Docks

(The first of a series of reproductions of some of the most striking photographs in the Society's library.)

Council on Solid Fuel is starting a new information service, by which women enrolled as Associates of the Council will receive a monthly news letter, and other publications, concerned with the domestic use of solid fuel. Particulars from Mrs. E. Fraser-Stephen, Organizing Secretary, 18 South Molton Street, London, W. 1. ★ Dr. Clarence A. Mills, head of the department of Experimental Medicine, University of Cincinnati, has carried out a preliminary investigation at Donora, scene of the fog disaster last October. A house-to-house canvass showed that in addition to the 20 human fatalities, 800 animals had died. Of 7,670 residents questioned 3,212 reported serious effects, 603 were treated by physicians, and 277 others sought medical aid unsuccessfully. Dr. Mills says: "A slightly higher poison

content in the air or a few hours longer time and the whole community might have been left almost devoid of life." One of the most comprehensive studies of air pollution ever undertaken has now started in the district. The study group will include two or more physicians, four nurses, a dentist, a medical technician, six engineers, and two statisticians. They will take in the entire valley area in which Donora is situated. ★ A new smoke prevention ordinance has been adopted, after ten years' effort, in New York City. A Smoke Control Board is established in the Department of Housing and Buildings, and has extensive powers to make rules and regulations, with prior approval over all new fuel-burning equipment.

Four New Publications

Investigating Pollution — the Alkali Works Report — Fluorosis — House Heating

The Investigation of Atmospheric Pollution. Fuel Research Station, D.S.I.R., pp. 47 ; not published for sale.

This duplicated brochure can truly be said to fill a long-felt want. It is sub-titled as "a description of the aims and objects of the Investigation, and an account of the methods recommended for making systematic measurement of the Pollution." As most of our readers will know, the systematic measurement of air pollution is carried out by local authorities, co-ordinated by and under the auspices of the D.S.I.R. through the Fuel Research Station and the organization known as "The Investigation of Atmospheric Pollution," in which all concerned co-operate. Advice on siting and operation of instruments is obtainable from the Fuel Research Station, which has a Superintendent of Observations and technical staff, and is also responsible for the publication of the records.

The value of the investigation is largely dependent on the number of stations at which observations are made and on their continuity over a long period of years. It is encouraging that more and more local authorities should be considering starting to co-operate—one of the things they were urged to do, incidentally, in a resolution passed at the Cheltenham Conference last year. A full explanation of the apparatus, its operation, analysis of deposits, cost, attention required, and other details is naturally demanded before it can be decided to participate in the work. This information the new brochure supplies in a compact and practical form.

In addition to general information about the organization of the work there are explanations and diagrams of each of the instruments used, and a

section on the new rapid surveys. Useful notes are included on the interpretation and presentation of results, the factor of casual error, and similar practical points.

The brochure is not offered for sale but copies may be obtained by those interested on application to the Director, the Fuel Research Station, Blackwall Lane, Greenwich, London, S.E.10.

84th Annual Report on Alkali, etc., Works. By the Chief Inspectors. For the year 1947. H.M. Stationery Office, pp. 44. 9d. net.

If we were to attempt to quote or discuss all the material in this Report that is of especial interest this review would begin to approach the length of the Report itself. Those of our readers who have a broad technical interest in the whole range of atmospheric pollution problems are therefore urged to obtain a copy and read it in full.

They will be particularly interested in the section on colliery spoilbanks and that on "unregistered processes," in which reference is made to emissions from electricity generating stations, other boiler plants, metallurgical furnaces, iron and steel works and gas works. Of the position in general the Chief Inspector for England and Wales, Mr. W. A. Damon, writes: "The standard of operation of works in 1947 was generally higher than in recent previous years. The improvement may be attributable to the better type of labour which is becoming available and the growing experience of younger employees."

The position with regard to the vexed question of burning spoilbanks continues to deteriorate and a comment is made about the attitude of local

authorities: "The position of local authorities varies. There is often not much energy displayed until complaints have become serious and by that time the fire is likely to have got such a hold that its control is proportionately more difficult. It is clear that the many other duties of local health officials leave them little time to give full attention to what is in itself a problem of magnitude. In instances also lack of technical knowledge causes hesitation in attempting to refute a statement that the "best practicable means" are employed.

On prevention the Report states that "continuous fine water spraying remains the most effective method of dealing with burning spoilbanks. In cases where a series of mounds have been formed by tipping from an aerial ropeway, good results have followed their breaking down and consolidation into a more extensive plateau by means of tractors and drags. This method has the advantage also of providing fresh tipping space under the ropeway. Refuse which has been thus consolidated has remained free from combustion but the process should not be interrupted as undue delay in breaking down the initial mounds is likely to result in their firing. Similar levelling and consolidation is also advantageous on flat spoilbanks where tipping has left an uneven surface."

Among the "registered" works the problem of cement production works is discussed. It is pointed out that the drive to reduce fuel consumption has led to lower kiln-end temperatures and tendency for the gas to fall below the dew point in the flues leading to the dedusting plant and in that plant itself with consequent heavy corrosion of parts. On Thames-side a number of mild steel flues have had to be scrapped and at least one electrostatic precipitator has been made useless.

"The design of dust arrestors of the cyclone type has greatly improved in recent years," writes Mr. Damon, "and efficiencies of a high order can now be guaranteed, though I believe that they do not attain the efficiency of an electrical precipitator *which is in really good order.*" The italics are significant.

There is a separate report by Mr. E. A. Balfour Birse, Chief Inspector for Scotland, which among other problems of general interest also discusses colliery spoilbanks. The fluorosis problem that is the subject of another review is referred to, and the emission of fluorine is in addition the subject of an appendix to the Report for England and Wales. Emissions from brickworks, pottery, etc., kilns, and during the calcination of ironstone have been noted. The problem has been thoroughly investigated by the British Pottery Research Association, which has issued a series of recommendations that are given in full. In summary it is said that there is evidence of fluorosis symptoms in cattle which have fed over a long period on herbage contaminated with fumes from certain brickworks, but that there is no damage to human health. "Material damage in the form of etching of glass has been noted. An efficient form of scrubber has been developed by which the fluorine compounds from pottery kiln gases can be removed but it is thought that dispersion of gases at a higher altitude will probably render the installation of such scrubbers unnecessary."

Industrial Fluorosis. A Study of the Hazard to Man and Animals near Fort William, Scotland. Medical Research Council Memorandum No. 22. H.M. Stationery Office, pp. 131. 4s. net.

Aluminium is produced, in the process concerned here, by the electrolysis of aluminium oxide in molten cryolite, a naturally occurring fluoride of aluminium and sodium. During the process a small amount of fluorine is lost in the form of fume, escaping into the furnace and other rooms of the factory and into the outer atmosphere. It was suspected that the health of humans and of animals was being affected by this emission in the neighbourhood of the aluminium factory at Fort William, Inverness-shire, and a Fluorosis Committee of the Medical Research Council was set up to investigate the situation.

The report of this investigation is an admirably presented and well-documented volume that will be of considerable value not only in relation to the specific case examined but as a contribution to the general literature on fluorosis and pollution problems of a similar nature, and as an example of the methodology required for such an investigation.

The presence and concentration of fluorine in the atmosphere both in the works and in the surrounding district over a radius of several miles were determined. Analyses were also made for its concentration in the soil and herbage, in the blood and urine of humans, and farm animals, in the remains of the latter, and in the milk of cows. In all cases abnormal quantities were found. Some physical effects, in the form of bone changes, on workers in the factory were noted, but in no cases did this amount to clinical disability, while on the adults and children living in the district no ill-effects were determined.

The effects on livestock feeding on the contaminated herbage were on the other hand widespread and serious. This is due mainly to the action of fluorine on the teeth, causing mottling, distortion and deformity. Teeth and bone show an excessive fluorine content. The dental abnormalities hinder mastication and digestion, and lead to loss of condition and serious debility. In affected cows loss of milk is severe. The report concludes "it is important that everything should be done to reduce the amount of fluorine discharged from the factory."

The report is of especial interest in conjunction with the fluorosis hazards from other industrial processes referred to in the Alkali, etc., Works Report reviewed above.

The Economics of House Heating,

by Richard Eve, B.A.R.C.H., A.R.I.B.A., and J. C. Weston, PH.D., A.INST.P.
Reprinted from the Journal of the Royal Institute of British Architects, November, 1948. From the Department of Scientific and Industrial Research.

This paper is an account of the house heating experiments in twenty trial houses built at Abbots Langley for the Building Research Station, and covers the first stage of the investigation, in which the new houses were not occupied (although the heat services, hot water, etc., were used as if they were occupied). The second, and longer, stage, now in progress, is with the houses in normal occupation by families.

The houses are of similar design and construction, except for modification required by the heating systems used. Each is equipped differently, using open fires, openable stoves, gas and electric heating, central heating, gas, electric and solid fuel cookers, in various combinations. They fall into three groups of "partial," "two stage," and "whole house" heating.

A considerable amount of interesting data has already been collected and is discussed and indicated in tables and charts reproduced with the paper. Details of capital and running costs and of fuel consumption and of "work content" (i.e., tending appliances, in minutes per week) are given and can be compared, but with twenty houses concerned it is difficult to select points for special comment.

This paper, and the further reports that will in due course be available, will prove to be a material value to all concerned with raising the standards of house heating in this country. It is a matter of the highest importance to the smoke abatement movement, for the more efficiently a house is heated the less fuel does it use and it must, from the nature of the case, either be smokeless or be easily capable of being made smokeless.

The report is not priced, and applications for copies should be addressed to the Department of Scientific and Industrial Research.

As we go to press we learn with regret of the death of Col. W. A. Bristow, Chairman and Managing Director of Coalite and Chemical Products, Ltd. An appreciation will be given in our next issue.

THE SCOTTISH DIVISION

On the invitation of the Corporation of the City of Glasgow, the Annual Conference will be held in the Council Hall there on April 22nd, 1949. An address will be given by a lady to be known as the "Modern Housewife," who will ask a number of questions as to the action taken or to be taken by industrial organisations to mitigate the emission of smoke from furnaces and from domestic heating appliances. The questions will be answered by repre-

sentatives of the Department of Industrial Research, National Coal Board, Gas and Electricity Industries who will form a panel of experts. The afternoon session will be devoted to a visit to the works of a large industrial concern near Glasgow. Readers of *Smokeless Air* are invited to submit suitable questions for answer by the experts and the Secretary of the Scottish Division will be pleased to forward the answers to the questioners.



Southwark Scene, 1370 A.D.

An attractive and original smoke abatement exhibit for shop window or exhibition display designed by Ivor Morgan of the Gas Light and Coke Company's display section. It stands approximately 5 feet high and the ten figures are made of cartridge paper and are gaily coloured. The column of smoke is made of grey cotton wool.

The captions read: "In the year 1370 a citizen of Southwark was indicted for 'causing a filthy and fuliginous vapour by burning raw coal.' He was hanged!" and "Air pollution—a social offence six hundred years ago but a common practice to-day—can be avoided by the use of gas and coke the smokeless fuels."

Darkening Africa

Industrial Growth is Bringing Smoke

By W. R. Gordon

We are pleased to be able to reprint excerpts from an article that appeared in "The South African Engineer" by the former Director of the Coal Utilization Joint Council, who is now in Johannesburg and is associated with the National Development Foundation of South Africa, which is concerned with smoke prevention.

THESE winter mornings and evenings on the Rand see skies blackened by smoke. In industrial suburbs and in the centre of cities, where there are large blocks of offices and flats, as well as in the railway yards, nauseous fumes and soot are to be seen despoiling the pure atmosphere of the high veld. When you live on the top of a mountain plateau closer to the sun than most folk, you do not expect to live in an atmosphere daily getting more and more like the "Black Country" of the English Midlands. Yet recent winter fogs in Rand towns, thick enough to cause motorists to drive with headlamps in what should be broad daylight, have caused Dr. van den Bos, the Union astronomer, to think seriously of moving his observatory to purer climes.

But this growing smoke nuisance goes much further than the unfortunate incommoding of the Union astronomer and his assistants in making their starry observations. Smoke and its concomitant nuisance, soot, have been proved to have harmful effects upon public health, upon buildings, on vegetation and even on traffic safety. While cities in South Africa are, fortunately, far from the sad state of foggy Manchester or the Staffordshire potteries—to name but two of the worst areas in Britain from a smoke and soot emission viewpoint—is it not worth while taking time by the forelock and doing something about the matter now? Measures too vague and too late may mean that something which is to-day happily only occasional

may become permanent and harmful on a widespread scale.

So far as traffic is concerned, not only does smoke from industrial and domestic chimneys on windy days, billow down into the streets, but badly stoked steam waggons are a menace wherever their belching fumes are encountered on the road. To drive behind such a monster is a penance for any motorist. It will be a blessing when the South African railways—one of the worst smoke offenders now—are able to electrify all the lines on the Reef. Then, as in some cities in America, no steam trains will enter Johannesburg.

Careless Stoking

There can be no doubt in South Africa that careless stoking is responsible for a large proportion of unnecessary smoke. The habits of the native stoker, without proper European supervision, need no elaboration here. But, it may be remarked, good stoking which gives adequate heat with the minimum of smoke can only be the result of that golden rule of firing "little and often." To let a fire or a furnace burn down low and thus demand a large quantity of coal on the fuel bed suddenly, is a sure method to waste coal and make smoke. Stoking is an art. Not anyone can shovel coal into the fire doors of a boiler successfully—if the owner expects to get satisfactory results.

In the domestic sphere the reformer is up against the traditional love of the open hearth, burning coal or wood, so dear to the hearts of most people in South Africa. This sentiment cannot be overlooked. There is no doubt that the cheerful blaze of an open fire is much more warming to the heart as well as to the body than an electric, gas or central heating radiator. Yet many domestic fuel appliances, in the older houses especially, are in-



Johannesburg

(South African Railways)

efficient as space heaters and guilty as smoke-producers. The old Victorian type of grate, so frequent in England, is something which should be abolished in favour of newer, more up-to-date and more efficient appliances which consume their own smoke.

Public Opinion

To deal with this problem needs first of all an awareness of its existence and a body of enlightened public opinion sufficiently interested to ensure that South Africa, at any rate, shall never be stifled with smoke. Secondly, the powers granted to local authorities in this matter should be more closely defined and capable, in flagrant, unremedied cases, of being brought before the courts with a reasonable chance of the unrepentant offender being successfully prosecuted. And then, because co-operation and persuasion are so much better in these matters than compulsion, there is scope for some organisation to give practical advice on better combustion and smoke

prevention. Neither the Factories Act of 1931 nor the Public Health Act give much help to the conscientious health inspector. There is reason to believe that, with the wording of these Acts and the resultant by-laws being so vaguely worded, some municipalities are reluctant to prosecute. Yet smoke emission can be measured by properly screened glasses or by deposits on special paper disc filters. It should not be impossible for local health authorities to detect serious smoke offenders, to offer them instructive advice to mitigate the nuisance and then to prosecute those who prove recalcitrant. If adequate measures are taken now the atmosphere on the Rand and in other South African industrial centres may remain as pure as when the first explorers set gaze upon the virgin veld and its kopjes. If the subject is neglected, as it appears to be at the present time, a gloomy darkness, black as night, may descend upon an otherwise sunlit land.

SMOKE PREVENTION ABSTRACTS

Acknowledgments are made, where required, to the Abstract sources indicated

91. District Heating and its Influence on Town Planning, Margolis, A. E. (Public Health and Municipal Eng. Congress, London, 18 Nov., 1948). The outlined development of co-ordinated heat and power generation is the last stage in the development of both central heating and electric power generation. Each service by itself is wasteful in coal consumption, but when combined the coal consumption is reduced to a minimum. An overall thermal efficiency of 80 or even 85 per cent. is obtainable, comparable with the efficiency of hydro-power generation. The national value of co-ordinated heat and power generation will, however, be much greater than that of hydro-power generation because considerably more coal is saved and at a lower capital cost, and in addition a new ideal heating service is created. The increase of the adiabatic heat drop and the improved efficiency of turbo-alternators have considerably improved the economy of heat-electric generation, because with the same exhaust heat supply more electricity can be generated. The area of heat supply for a given power capacity is to-day only a quarter of that required in the early stages of district heating in Hamburg, thus reducing the cost of the heat distribution in almost the same proportion. Should therefore the gas turbine be introduced, which requires less cooling water, the economy of combined heat and power generation would not deteriorate but would improve.

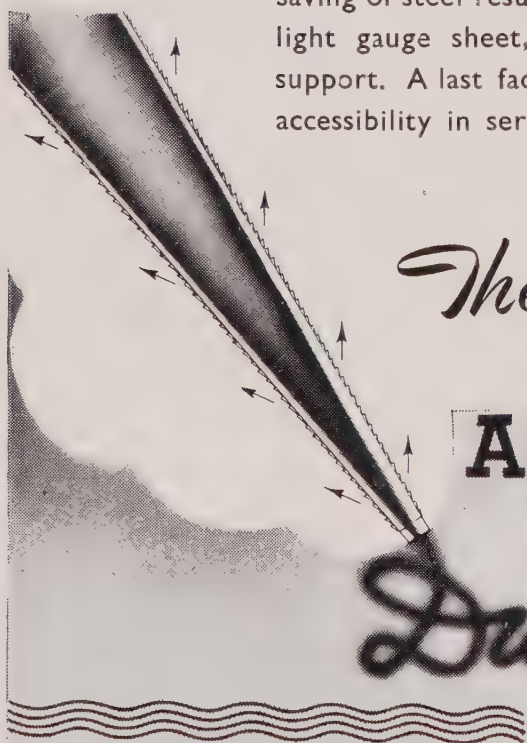
92. Sound Waves now Harnessed for Industry, Porter, R. W. (Chem. Engng., 1948, vol. 55, (3), 100). Large-scale application of high-frequency sound waves in industry have been developed. A high sound-wave intensity can be achieved with a new sound generator, developed by the Ultrasonic Corporation. Its main use to date has been in aerosol agglomeration. The recovery of smoke, dusts and mists can be effected by this means. The

generator is essentially a high-speed air siren, driven by a variable-speed turbine. Frequency is governed by the speed of rotation, and intensity by the amount of air admitted to the generator. In agglomerator towers the sound generator is placed at the top and the sound vibrations directed downwards. The first industrial application was developed for the manufacture of furnace black from natural gas, and gave a 96 per cent. recovery. The intense sound waves give the particles a wide velocity distribution, leading to more collisions, and thus to agglomeration. Particles of dimensions 15-100 microns are the largest to be affected in this way. Subsequent separation by a cyclone separator is greatly facilitated. Other projected applications include soda recovery from stack gases, salt-cake recovery, sulphuric acid mist precipitation, dust recovery from flue gases, and dispersion of natural fog; as an aid to spray drying, together with certain applications in the liquid-solid field. (*Inst. Petroleum*).

Combined Action of Carbon Monoxide and Benzene Vapour, Chernov, V. M., and Libeman, S. S. (*Farmakol i Toksikol*, 1947, **10**, 22; abstr. in *Industr. Hyg. Dig.*, Aug. 1948, **12**, (8), 28). Experiments were performed with mice to determine the combined toxic action of carbon monoxide and benzene, such as might develop in those working in motor transport. The concentration, period of exposure, and temperature of air in the vapour chambers were noted. It was found that neither carbon dioxide alone nor benzene alone caused a very marked mortality at certain temperatures. But when animals were exposed to the two together the cumulative toxic effect was notable. A rise in temperature considerably increased the toxic action of benzene. The practical importance of these observations is great in view of the many cases of poisoning among those exposed to the two hazards.

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"CommerceWeekly."

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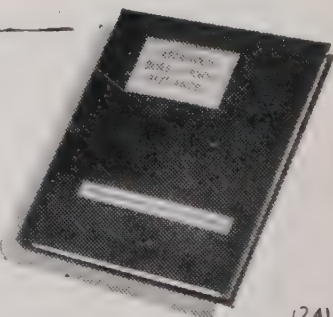
Type of Appliance	Services provided	Efficiency
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Open Fire with back boiler	Space heating and hot water for domestic use or radiators	45%—50%
Open Fire with large back boiler	Space heating, domestic hot water and radiators	50%—57%
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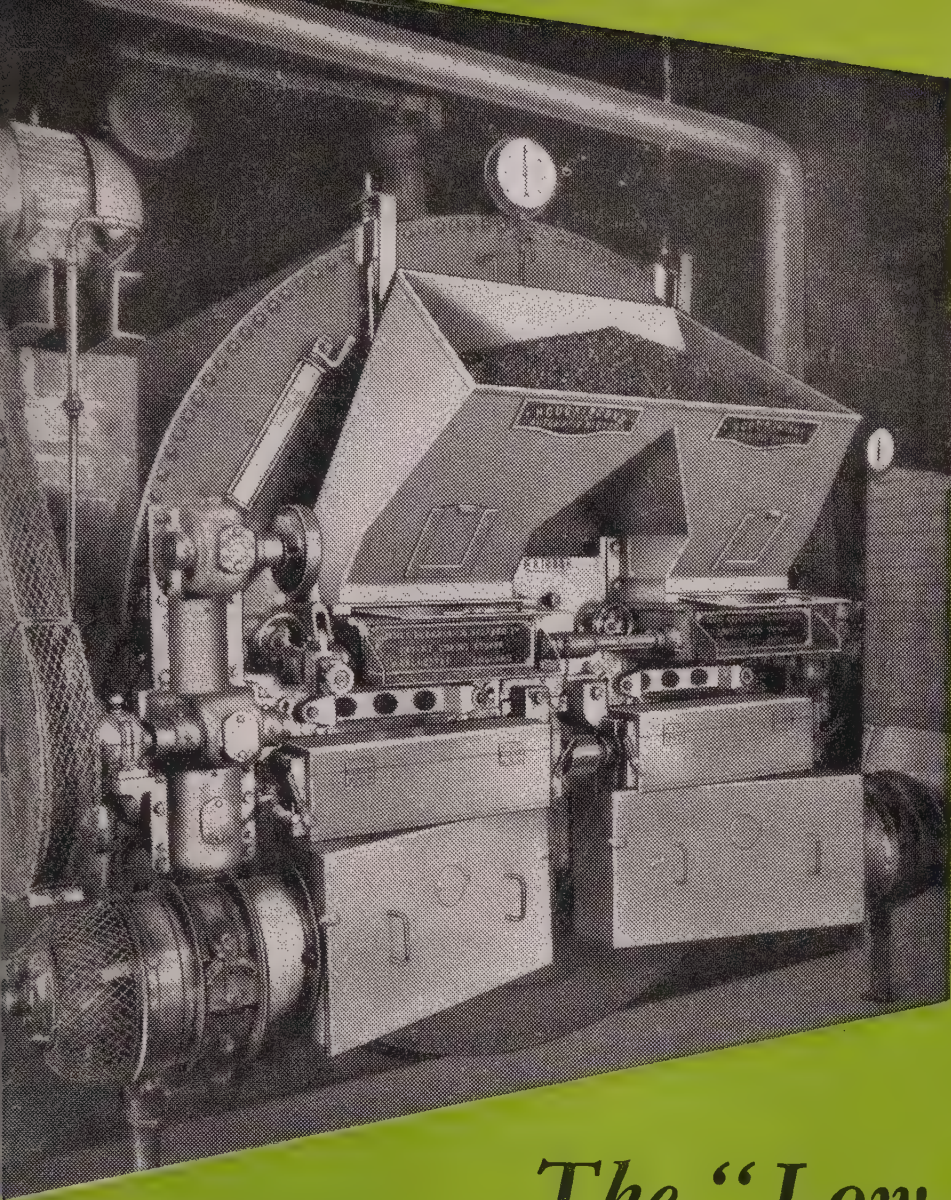
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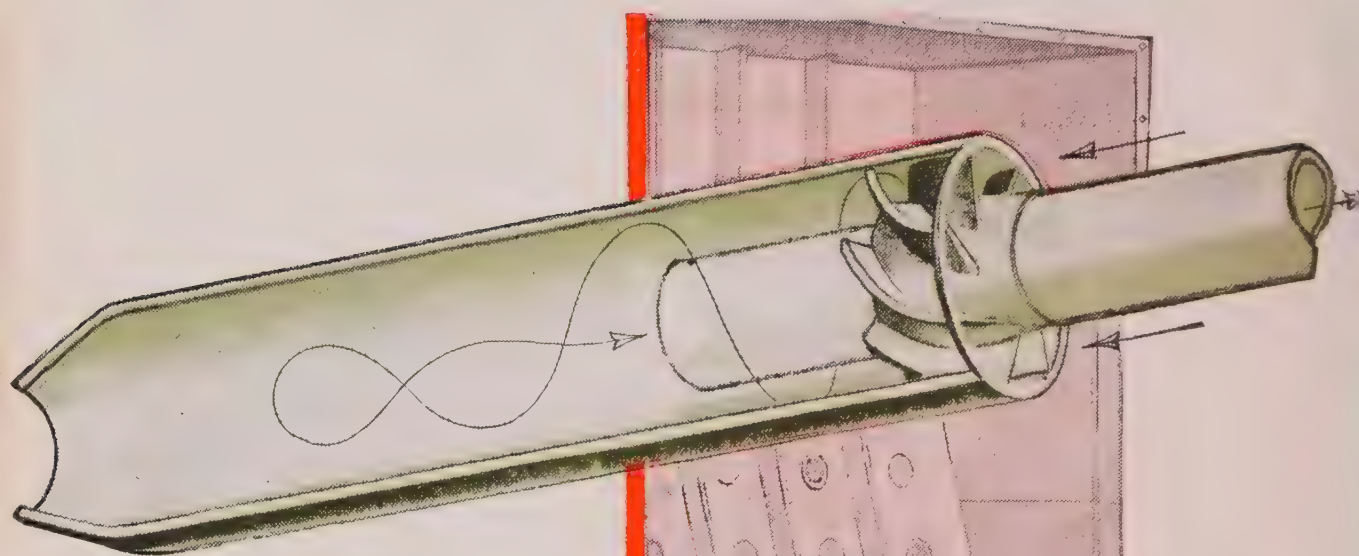
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THE SMOKE ABATEMENT JOURNAL



No. 70

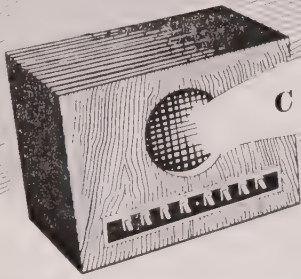
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1949

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In this Issue

Smoke Inspectors' Case Book
Manchester's Code for Prior Approval
The Despoilers. Railway Electrification
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FUEL USAGE ANALYSIS

—a first step to lower prices

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Interest” is the
secret**

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It is almost always found that efficiency starts at the top. If Management is actively interested in its usage of fuel, heat and power—if Management is constantly asking questions and listening sympathetically to its engineers’ suggestions—its influence is infectious. From the Chairman’s office all the way down to the coal yard, people begin to sit up and pay attention.

**“Fuel Usage
Analysis”—what
it is and how
to start it**

It is not enough to know the total amount of fuel, heat and power used every day or week or month. More details should be sought and many more questions asked. How much does each department and each process use? Who is too cold and who is too warm? Would it be helpful to instal steam-meters and thermometers and other instruments—and who should be responsible for their regular calibration and maintenance?

Once Management starts asking itself questions, it will begin to achieve results. Some pertinent questions are available. Later advertisements in this series will direct you to them.



CLEAN SWEEP

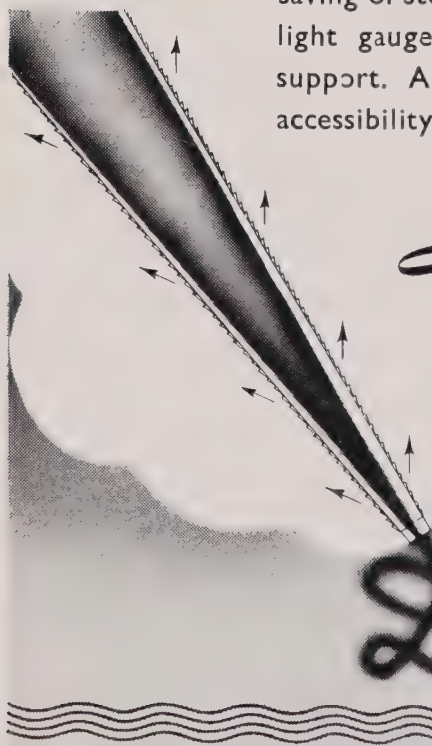
Mr. Therm can make a clean sweep of air pollution by soot and smoke. With his two smokeless fuels—gas and coke—Mr. Therm can meet the requirements for improved heating services in Britain's



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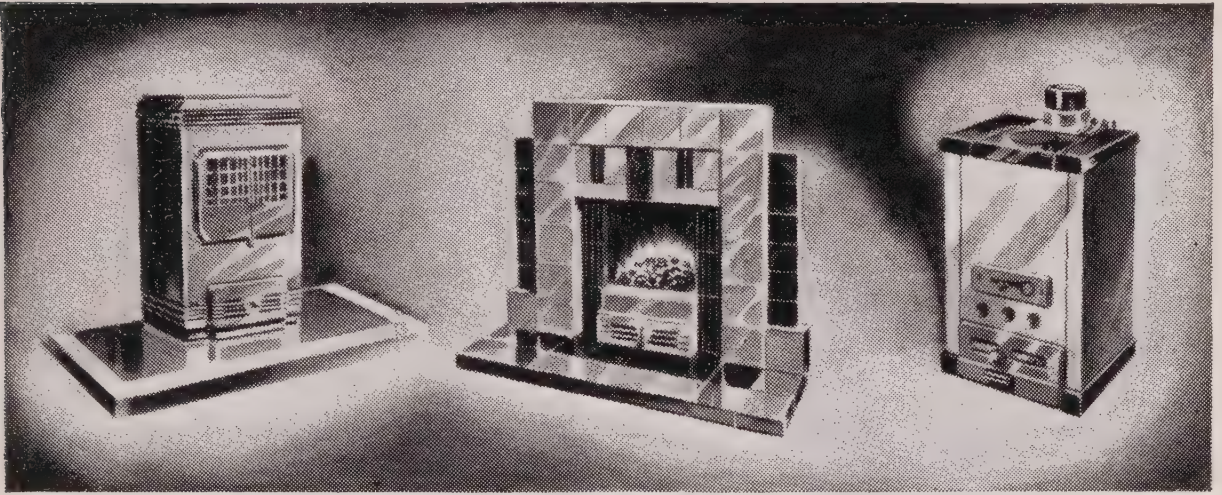
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A modern coke boiler for hot water supply.

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*From the Simon Report
on Domestic Fuel Policy*

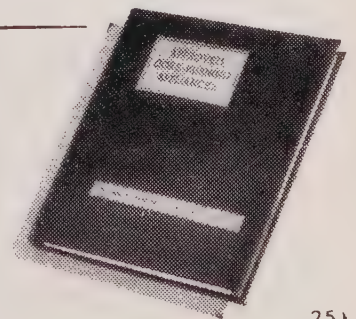
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SMOKELESS AIR

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Summer, 1949

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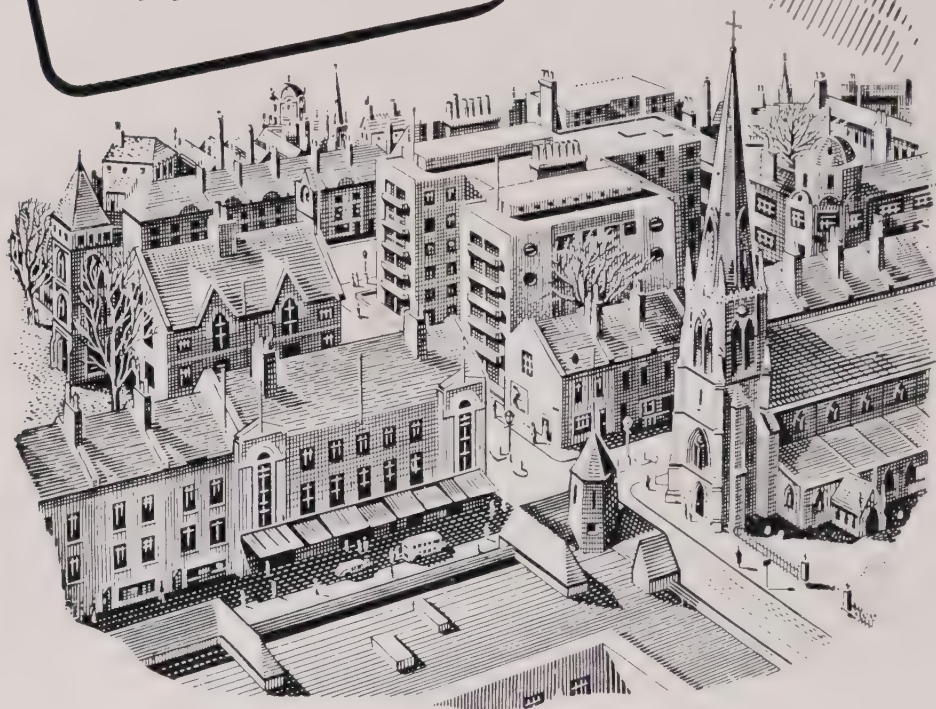
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Open unto the fields, and to the sky ;
All bright and glittering in the smokeless air.*

SMOKELESS AIR

THE DESPOILERS

AT first sight this article may seem out of place in these pages, for it may not seem to be directly concerned with atmospheric pollution. But, as will be seen, there are links that will logically justify its inclusion in this journal.

Much attention has of late been focussed on what is becoming recognized as one of the gravest problems facing mankind : that of so conserving the environment on which we depend for the essentials of life that our race will be able, not just to flourish, but to survive. Lord Boyd Orr, has, for example, persistently stressed the dangers of the world food position, and now

the basic problem is surveyed in an eminently thoughtful and convincing book* by Fairfield Osborn, who is President of the New York Zoological Society. A careful reading of this work cannot fail to make one acutely impatient with the appalling shortsightedness of humanity. "Reading it," said Albert Einstein, "one feels very keenly how futile most of our political quarrels are compared with the basic realities of life."

Mankind has developed and survived not only because of his few highly specialized endowments—his eye, foot,

* *Our Plundered Planet*. Faber & Faber, London, 10s. 6d.

and brain—but because he is one of the most *generalized* of all animals, able to adapt himself to extremes of physical environment. Compare this capacity with the highly, almost in some cases grotesquely, specialized animals—such as the anteater, or the giraffe—which can exist only in one sharply restricted environment. This amazing capacity of man's has so far ensured his survival and progress, but because of it he is now so seriously disordering his environment that he has placed himself in danger.

"The essence of man's situation," says Fairfield Osborn, "is slowly becoming obvious. His physical adaptability, in the pattern of biological history, provided, until recently, its own guarantee of his survival. The characterizing of man as a generalized type, and therefore as one most capable of adaptation to changing conditions, seems illogical now—outdated by the course of events of even the last few decades. Today one cannot think of man as detached from the environment that he himself has created. True, one never actually was justified in doing so. Yet even as recently as the latter years of the last century, the projections of man's mind in the form of the physical changes he was effecting on the earth itself were not of sufficient extent to be recognized as a new and profound change in the evolution and even in the destiny of mankind. The groundwork had been laid in earlier centuries. The explosion, world-shaking, has occurred in this one. The mechanical, chemical and electrical sciences, man's mind-extensions, are changing the earth. A concept, recently expressed, speaks of man as now becoming, for the first time, a *large-scale geological force*."

What, briefly, and therefore most inadequately, is the picture? The continuation of human life on this planet depends on water, soil, plants and animals. Today there are 2,000 million human beings, increasing in number by more than 50,000 every day, a large number of whom secure the essentials of life in stunted, pitifully low, measure. And more and more are they striving towards more adequate stan-

dards of sustenance. At the same time the natural resources essential to this growth and change are diminishing at an alarming rate. On all five continents the soil is being washed or blown away; by reckless deforestation and other maltreatments of the land the water supplies are falling; the delicate balance of plant and animal life is being shaken—mankind, in fact, is destroying the natural environment upon which he depends.

Consider a few of the many facts gathered together by Osborn: there is estimated to be not more than 4,000 million acres of arable land available in the whole world; there are 2,000 million people to feed and the number is increasing by 20 millions a year; and yet $2\frac{1}{2}$ acres of productive land are required to provide even a minimum adequate diet for each person. Many countries have less than an acre of productive land per head. It takes 300 to 1,000 years to replace an inch of the all-important fertile topsoil, of which in the United States alone 5,400 million tons are being lost annually by erosion.

In Greece, to take a European example, it is estimated that not more than 2 per cent. of the entire country has its original topsoil, and this only in isolated, still-forested, regions. Crops are grown on virtually sterile subsoils and as a consequence wheat production averages only $11\frac{1}{2}$ bushels per acre, compared with normal yields of 25 to 30, or in really good cropland, 50 bushels.

In the United States timber resources fell by 44 per cent between 1909 and 1945, and today the consumption and loss of timber exceeds growth by 50 per cent.

Though today the extent of destruction is so widespread the story is not a new one. The cradle of civilization, between the Tigris and Euphrates, was once a fertile and prosperous land, irrigated by the waters of the great rivers. In the course of centuries, perhaps by the cutting of forests or overgrazing, the lands deteriorated, and the great cities now lie under drifting sands. In Syria were once more than a hundred

cities that demonstrate the results of erosion at its worst: "They are not buried under sand," writes Osborn, "but stand up starkly on their rock foundations, their doorways several feet above the foundation stones, showing that the productive soil has been washed away from the very dooryards themselves. The limestone is there, but the red-brown soil has disappeared and cannot be seen at all except in small pockets where a wall has kept a little of it intact. In these pockets still grow the vines and olive trees that were once the glory of North Syria, the source of her prosperity. The remains of wine and oil presses abound in the region, cisterns among the ruins even now hold water, but there is no one here. The cities have been dead for a long time."

Examples could be multiplied, and no part of the earth seems to be free, in greater or lesser degree, from some form of irreversible decay.

Concerned with what may be called the living factors of our environment Osborn and other writers do not extend their surveys to the prodigal exploitation of the inorganic treasures we are taking, at an ever-growing rate, from the earth. Metals, coal, oil, rare earths, and minerals of all kinds are being extracted without thought for the future. True, they are of value only if and when they are mined and used, and the indictment here is that, despite the fact that they can never be replaced, so much of them is wasted with such casual carelessness: used and dispersed so that they can never be used again. This is another facet of the problem we have just discussed, and again is a matter of conservation and maximized utilization. So to order the world that waste is eliminated and the squandering of the riches of the earth is halted must mean an effort of which the results may not be enjoyed by the generation that makes it, but which will earn for it the respect and gratitude of the future.

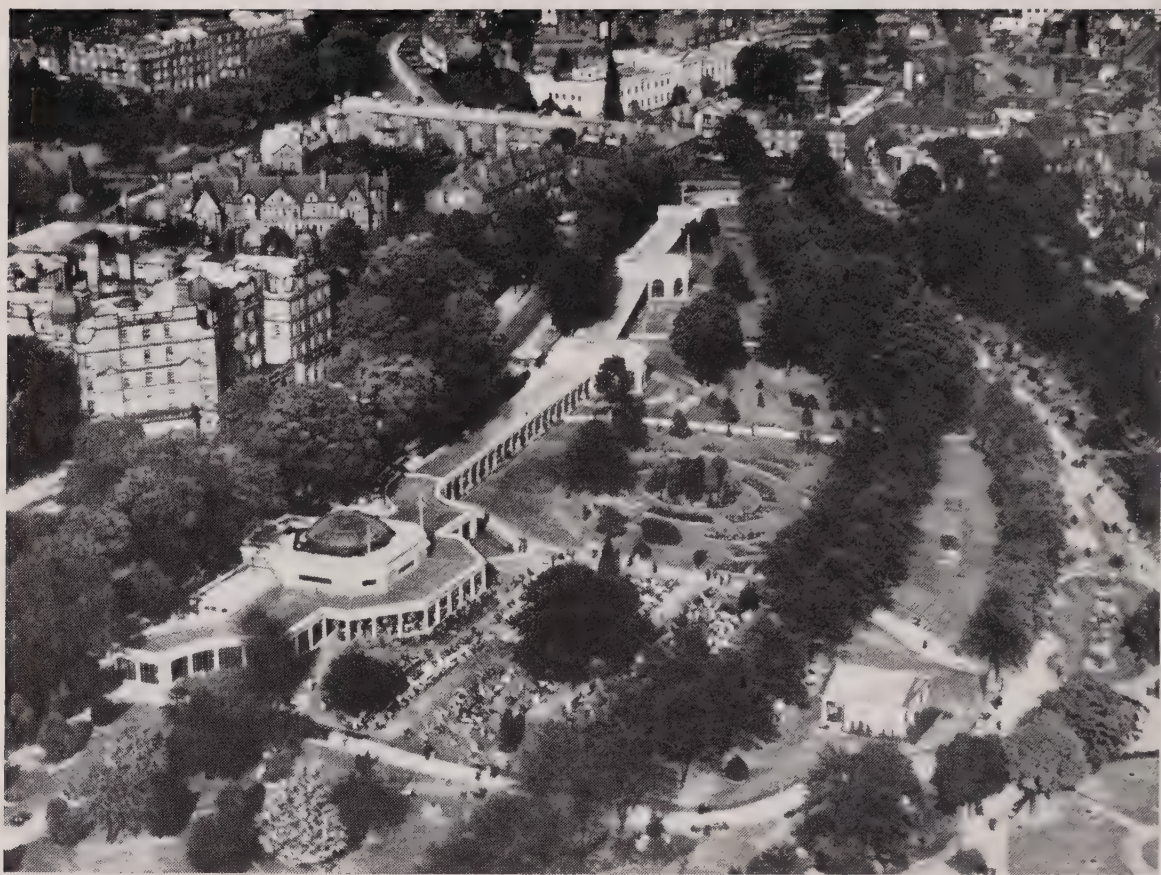
In our own island the gravest waste of natural resources is that of coal, and the sign and symbol of that waste is the smoke that itself is a direct cause of

further waste and is an agency in the attack on the productivity of nature. Our reason for discussing *Our Plundered Planet* so fully will now be apparent. Our smoke prevention movement can and should be seen as a small, but organized, part of a still largely unorganized, fumbling, but growing movement of thought and understanding that is seeing the need to keep this new geological force, mankind, in harmony with the natural forces of the earth. The link between smoke prevention and this world problem of natural equilibrium is in fact stronger and more direct than has been recognized.

A paper by G. R. Watt, of the Department of Terrestrial Magnetism, Carnegie Institution of Washington,* has shown that the electrical conductivity of the atmosphere, which has been the subject of much research, varies considerably according to seasonal and other conditions, and that it is considerably reduced in cities and towns because of the destruction by particles in smoke and combustion gases of the small ions on which conductivity depends. This may be a matter of academic interest only, with no practical consequences, but more significantly it has been found that a gradual and permanent reduction in the conductivity of the air over the oceans is in progress, and that this is probably due to the gradual accumulation *through the years* of smoke and gases from ocean-going ships and from the towns and industries of nearby continents. "Thus," to quote the author direct, "we see that, like a living thing, the conductivity of the lower atmosphere finds survival increasingly difficult in our modern industrial age. Civilization is taking its toll of this as it is of the many more tangible things."

"What does it matter?" is the question that may be asked, and at present we can only answer that we do not know. We should, however, remember that the same question may have been asked by the ancient Syrians or the pioneer farmers in what is now the Dust Bowl.

* *Journal Washington Academy of Sciences*, Vol. 26, No. 10, Oct. 15th, 1946.



TO HARROGATE IN SEPTEMBER

THE Society's 16th annual conference will open at Harrogate on Wednesday afternoon, September 28th, with the Presidential Address by Lord Simon of Wythenshawe, and will close on Friday evening, the 30th, with a conference dinner. Between these events there will be a civic reception by the Mayor of Harrogate, a visit and address by Mr. A. Blenkinsop, M.P., Parliamentary Secretary to the Ministry of Health, four conference sessions, and a late afternoon excursion to Fountains Abbey.

The subjects for the conference sessions will be a discussion on a further series of "Progress Reports," which was the most popular feature at Cheltenham last year; the difficult problem of burning colliery spoilbanks, with an opening paper by a representative of the National Coal Board, Mr. J. Carr; a paper on the story and work of the Fuel Research Station by its Director, Dr. A. Parker; and finally a paper considering the consequences of smoke and the smoke abatement move-

ment's use of their case from an outside standpoint.

The pleasant spa of Harrogate, with its unique green Stray, its gardens, the fascinating antique shops, the wealth of good hotels, and its position between the grim smokiness of the West Riding industrial belt and the quiet, unspoilt beauty of the Yorkshire Dales, needs no introduction or build-up here.

Above is a view of Harrogate town, and below one of Fountains Abbey.



Smoke Inspectors' Case-Book

This is the first of a series of records from Smoke and Sanitary Inspectors of actual cases of interest and significance. It is hoped not only that they will be of interest to all our readers but that they may be of value to other inspectors and students, and that they will also help to give some idea of the good work in preventing smoke being quietly but effectively done throughout the country. More contributions are needed and all inspectors who have a story to tell are invited to send it in.

I. THE CASE FOR PERSUASION

A PART from technical ability and conscientious routine observation, the first essential of the Smoke Inspector must necessarily be a large amount of tact and the knack of making the approach at managerial level which will lead to co-operation and assistance and dispel the oft met reaction of irritation at any mention of regulations and restrictions, however justified or of proven necessity. The foregoing was amply demonstrated in a particular case which was recently satisfactorily dealt with in this district. During a routine district inspection, a smoke nuisance was observed emanating from the chimney of a firm of plywood manufacturers.

The Managing Director, on being informed of the nuisance, stated: "My last consignment of fuel contained two empty milk bottles, a dead cat and a ton of soil and, furthermore, the remaining coal is completely fire-proof. Instead of complaining, you should compliment us on getting these unsuitable fuels to burn at all."

Inspection of the plant showed it to be a 6 ft. 6 in. by 18 ft. Cornish Boiler at 100 lbs. per sq. inch, hand fired, burning a 50-50 per cent. proportion of outcrop slack and washed deep-mined slack. Smoke was found to be due to heavy spread-firing at too long intervals, frequent raking and slicing, also lack of secondary air due to the fire-door vents

being blanked off. Inquiries revealed that this blanking had been done against the advice of the engineer. It was also observed that the stoker had no means of knowing what was happening at the chimney top owing to his view being restricted by a recently-constructed connecting gantry between two building blocks.

It was found that the stoker was quite a skilled man but had shown his resentment of the view restriction by a complete lack of interest in his firing, being content only to maintain the required steam head. After a considerable amount of persuasion, the management agreed to have the secondary air vents restored and made operative and also provide a mirror to enable the stoker to see the chimney top from the firing floor. It was recommended to the stoker that he adopt light side firing methods and restrict the use of the slice.

The next visit to the firm was marked by the absence of the previous hostile attitude and it was found that all the recommendations made had been carried out with satisfactory results and, although no comparative fuel or steam figures were available to show any fuel saving or operative improvement, a more co-operative and generally helpful state of affairs was now stated to exist with the management, and engineering and stokehold staff, who now felt more "in the picture" and not people to be completely ignored except on the occasions of breakdown or other troubles.

Subsequent observations of this firm's

chimney-stack have shown no smoke outside the standard limit and it is submitted that no better results could have been obtained by the use of legal or statutory powers and that these should be invoked only as a last resort.

—V.W.

2. AN UNUSUAL NUISANCE

Just prior to the outbreak of war an industry new to England was established on the seaboard of this town with the object of manufacturing hard burst magnesite by a process of manufacture utilizing magnesium limestone and sea water. Magnesium lime is brought into contact with sea water in large settling tanks, the precipitate drawn off, and excess moisture extracted therefrom by rotary filters. The resultant paste is then fed into a rotary kiln fired by pulverized coal and hard burnt under natural draught.

At the outbreak of war this plant was taken over by the Ministry of Supply and additional plant laid down so that eventually three kilns were in operation. The product replaced a source of supply that was no longer available on account of the war.

Each kiln is connected with a large chimney and coarse dust given off in the process of burning is to some extent collected in a cyclone and in a flue leading to the base of the stack, though some dust of a very minute size is emitted into the atmosphere. The size of the dust emitted is probably in the region of 2-4 micron. As will be appreciated, the paste fed into the kilns contains a large percentage by weight of water containing common, calcium and other salts found in sea water. The result is that there is a very heavy emission of what appears to be white smoke from each chimney. In fact, it is probable that 90 per cent. of the emission is water, *i.e.*, a non-persistent gas vapour, but it would appear to be made persistent by the presence of the

above-mentioned salts as this plume is not noticeably affected in any way by weather conditions and there is practically no noticeable condensation. In heavy, humid weather, the smoke plumes descend almost directly to the ground with a density probably exceeding that of a London fog, and these streamers persist for many miles over the land or the sea.

Towards the end of the war vigorous protests were made to the Ministry with regard to this nuisance, who at first insisted on the submission of technical data as to the degree of nuisance, etc. It was not, however, possible to obtain dust deposition readings, etc., as suggested by the Department of Scientific and Industrial Research, as the very stringent weather conditions required for these particular observations very rarely obtain in this seaside area. In view of the foregoing difficulties, another method had to be found, and on suitable days a series of aerial photographs were taken showing this plume drifting over this town and over the adjoining county borough. These photographs were submitted to the Ministries concerned who in turn, in due course, agreed that a nuisance existed and that necessary technical data would be obtained as to the best mode of dealing with this nuisance. As there was no previous experience to work on, experimental work has been carried on at the plant with dust washers and electro-static precipitators to see if they would effectively control the nuisance. The result of these experiments suggests that a very considerable diminution can be obtained in the emission of both dust and fume. Further extensions are planned and at the same time it is hoped to install the necessary apparatus to control this nuisance.

Apart from the fact of the unusual nature of the nuisance, it is also a matter of interest that it is probably the first time that an aeroplane has been used in obtaining proof of a nuisance under the Public Health Act.

—G. A. WARD,

Senior Sanitary Inspector, Hartlepool.

3. SAWDUST PACK IN FURNACE

Complaints were made of smoke and fumes being emitted at ground level from a works, the fumes being of a nauseous nature causing people who inhaled it to be very sick, even causing vomiting.

Investigation showed that high temperature electric furnaces were being used and as it was impossible to use refractory material for insulation, a special "pack" was used for this purpose, composed of coke ash and sawdust, which retained the heat, but allowed any generation of gas to escape.

The smell was caused by the burning of the sawdust in the early stages of the operation; most of the smoke and fumes was emitted from the works at ground level, being carried by the wind to adjacent houses.

To remedy this, it was suggested that metal ducts and vertical shafts be placed over the furnaces with extractor fans to take the fumes and smoke to atmosphere at a high level. It was found that a gantry crane was required at all times, to move rapidly over the furnaces and add additional "pack" during operations, so this scheme had to be abandoned. It was then suggested that the percentage of sawdust should be reduced but the management were of opinion that this would cause serious difficulties with the process and not allow the gases generated to escape.

Eventually this method was tried and after a successful period of test the sawdust content was further reduced.

Then an unfortunate incident occurred and an explosion blew the end out of one of the furnaces, fortunately not causing any injury. This was attributed to the reduction of the sawdust, but investigation showed that rain leaking from the roof during a storm had caused a short-circuit on the electrical terminals, resulting in a complete "blow-out." Eventually, the sawdust was reduced to one per cent. and the fume and smell were reduced to a minimum.

This investigation and remedial work took almost three years to complete, but it has been of advantage to all concerned, for the cost of production has been lowered, the inconvenience to the workpeople and residents in the vicinity no longer exists, and the atmosphere is comparatively clean at all times.

Tribute must be given to the manufacturers who co-operated.

—J.L.

4. AN OIL PLANT PROBLEM

A somewhat unusual smoke nuisance was experienced in this city in the past winter. The firm concerned was a local laundry and in the past few years trouble from their chimney had occurred from time to time, so that when the coal supply position became acute after the war, the management decided that conversion from hand-firing of coal to creosote-pitch burning would meet all their process demands and also cure their smoke problems.

The plant consisted of two 8 ft. 6 in. by 30 ft. Lancashire boilers at 100 lbs. per square inch supplying a 460 volt D.C. generator exhausting into a low pressure steam main for process work, with a high pressure by-pass through reducing valves for supplementing.

A gravity fuel system with low pressure air was decided upon for the creosote-pitch plant and consisted of an 8 ft. by 18 ft. settling and storage tank sited on brick stools with 10 ft. head, arranged adjacent to boilers but outside the boiler-house and open to atmosphere and without lagging. An oil-transfer pump beneath the tank supplied oil to a service tank above boilers at 25 ft. head, the pump being float controlled from there. Fuel oil delivery lines to furnaces were arranged with individual gate valves at boiler fronts for control. Heating of storage tank was arranged by integral steam coils from low pressure steam main, trapped to waste. Atomizing temperatures were obtained by steam-jacketting the fuel delivery lines, the drains from jackets

also being trapped to waste. The air supply was of the common type with a controlled pressure through the atomizer and a variable supply arranged concentrically around it. The whole was a "mock-up" arrangement made by the firm's staff and worked satisfactorily until extreme weather was experienced in February. It then began to be noticed that it was very difficult to change from the light load night periods to full day-time load without smoke emission which culminated in an emission of about 40 minutes of a pall of that heavy dense objectionable smoke, which is a feature of incorrect oil burning and resulting in a shut-down of the plant.

As is well known, but cannot be too often stressed, oil can only be satisfactorily burned under correct atomizing conditions and that means correct temperatures must be maintained and consequently reliable instruments are an essential.

In this case, when the nuisance complaint was received and subsequent investigation made, it was found that the cause of the trouble was the freezing up of the fuel pipe steam jacket drains which rendered the traps inoperative consequently reducing the temperature of the fuel oil at the burners. This should have been at once apparent to the firemen had the fitted thermometers been correct, but in both cases the mercury was "broken," and, furthermore, the operation of temperature control had grown into a "rule of thumb" method of "so much opening of the globe valve steam inlet to jackets for given loads."

Although the fuel lines in this plant and the jackets had been satisfactorily lagged the drain pipes had been overlooked and the staff had found it inconceivable that the pipes could freeze with live-steam in them, but the underlying cause of this trouble was the neglect to maintain and use the necessary instruments provided for correct operation.

It was recommended that *all* fuel jacket, steam and drain lines be lagged together with the storage tank and to date no further trouble has been experienced with this firm.

—V.W.

London and Home Counties Advisory Council

The annual general meeting of the London and Home Counties Advisory Council for Smoke Abatement was held in the House of Commons on May 4th. Mr. F. H. Keeling, M.P., was re-elected President, and Alderman T. W. Burden, M.P., Vice-President. Dr. A. Shinnie, Westminster Medical Officer of Health, and Mr. Clifford Ratcliff were re-elected Honorary Treasurer and Honorary Secretary respectively. A talk by Dr. A. Parker, Director of the Fuel Research Station, on the work of the station in relation to atmospheric pollution, followed the business meeting.

Following the extension of the boundaries of the area to include the Home Counties twenty-seven new members have been enrolled, making a total membership of ninety-three local authorities.

The report of the Executive Committee refers to smoke from tugs and other vessels on the Thames, and states that during the past year there has been little or no improvement in this extensive smoke nuisance. The matter is being investigated, it was stated, by the appropriate authority and the Association of Master Lightermen and Barge Owners.

Wind Tunnel Tests by B.E.A.

The path and diffusion of smoke and chimneys gases can be calculated for chimneys in open country, but the presence of buildings gives rise to air currents that upset all calculations. The British Electricity Authority are therefore having wind tunnel tests taken at the National Physical Laboratory on scale models of projected power stations. Bankside, London, has been the first station to be so tested and it is understood that early results show the need for an increase in chimney height to "avoid risk of the stack discharge impacting on the dome of St. Paul's."—*Abst. from "Electrical Times," June 2nd, 1949.*

New Publications

District Heating In U.S.A.—A Gas Centenary—Dust —Coke-Burning Appliances

District Heating in America. National Building Studies No. 7. 8vo. pp. 191, H.M. Stationery Office, 1949. 4s. 6d.

In this country domestic heating is probably worse, and responsible for more atmospheric pollution, than that in any other country where human habitations have to be heated at all. Scarcity of coal, its increased cost, the impossibility of obtaining domestic help in ordinary households, and some increasing interest in the reduction of domestic smoke have, however, recently resulted in much thought being given to domestic heating, in the production of grates for burning smokeless fuel, and in the possibilities of district heating. The Survey of Atmospheric Pollution recently carried out by the Society showed how far we in this country have yet to go, and the assistance that we can obtain in the solution of these problems from the U.S.A. and Canada, in parts of which temperature variations of much greater magnitude have to be met, is very welcome.

The Mission sent to the U.S.A. and Canada in 1944-45 by the Ministry of Fuel and Power, the Fuel Research Station, and the Building Research Station, made a valuable contribution to our knowledge of domestic heating in general in those countries.* The development of new towns and the reconstruction of bombed central areas of many of our towns has increased the interest in district heating, and the Ministry of Fuel and Power with other interests sent a further mission in 1947 to the U.S.A. to investigate this method of heating that had been so much more intensively developed in that country, and their report contains much valuable information and must be read in conjunction with the original report.

In considering this report it is necessary to remember that in the U.S.A. the object is to maintain the whole of a house at a uniform temperature of 70 deg. F. and not one or two rooms—or, more correctly, one point in one or two rooms at a temperature of from 60-65 deg. F. while the rest of the house, including the water pipes, may be well below freezing point, and also that there much more attention is paid to insulation of the house and air leakage that heat losses are much reduced.

District heating in America began at the beginning of the century, when the exhaust steam from the small electricity generating stations common at that time, frequently was blown to waste and electricity undertakers were able to offer not only electricity supplies but also steam for heating. No attempt was made to collect condensate and steam was delivered through a single main, a system still used in areas where the streets are already congested, and the use of steam avoids pumping hot water to the upper stories of tall buildings common in American cities. It is interesting to note that in 1946 48,000 million pounds of live and exhaust steam were sold for "down-town" or business quarter heating at a price from 50-100 cents per thousand pounds or 3.2 to 6.7 pence per therm. Nearly one-third of the authorities are thermo-electric, at least in part, and New York authority has announced its intention of combining district heat supply with power generation which it is estimated will save 46 per cent. of the fuel that would be used for separate production of district steam.

Of recent years the district heating of housing estates has progressed rapidly, assisted by the coming on to the scene of the Federal Public Housing Authority,

* Domestic Heating in America, H.M.S.O., 1946. Reviews in *Smokeless Air*, No. 62, Autumn-Winter, 1946

although in 1948 there were 69 municipal and 207 privately-owned district heating schemes. New blocks of flats are invariably supplied with central heating frequently linked to form a district scheme, but district heating is rarely applied to estates of individual houses for sale. The commission was convinced that district heating results in a substantial saving of fuel. Although there is a preference for steam heating, hot water systems have been used in some recent schemes, presumably for greater ease of temperature control.

The capital costs of district heating are higher than those of individual installations, particularly if savings in building construction, *e.g.*, by eliminating flues, are not taken into account, and to show an overall economy the costs of operating and maintaining a district scheme must be substantially lower than those of alternative systems. The majority of estate managers were strongly in favour of district heating. The fuel consumption to maintain the common standard of heating has been greatly reduced by adoption of structural insulation, a factor that has long been neglected in this country and which should be taken in hand by architects and housing authorities without delay.

The report gives a description of several selected schemes, among these one of particular interest to British readers is that of Seattle, Washington, where monthly average temperatures approximate to those of London. Although labour and fuel costs vary greatly between the U.S.A. and this country, the report should provide much useful information applicable to an examination of the problem of district heating and smoke prevention in this country.

The Gas Journal Centenary Number.

Walter King & Co. Ltd., 1949. 21s.

The *Gas Journal* celebrates its centenary in an excellent fashion by publishing a special number that is in effect a handsomely-produced and well-illustrated book in which is surveyed not only its own history but a great deal of

the fascinating story of the gas industry itself. Most centenary celebrations are of transient interest only, but in this volume Messrs. Walter King have produced something of permanent value.

Its appearance allows us to pass in review a century of progress in an industry that has contributed in no small measure to the reduction of the pollution of the atmosphere in our towns.

When the *Journal of Gas Lighting*, which was the name of the *Gas Journal* until 1917, was launched in 1849, sixty years had passed since Murdock had used gas distilled from coal for lighting offices and dwellings in Cornwall, and forty-two since Winsor had illuminated Pall Mall with coal gas. At this date also, when the industry has just been nationalized and the 1,017 undertakings in England, Scotland and Wales have just passed into the hands of the twelve regional Gas Boards, it is interesting to note that in London alone there were thirteen companies, some of which were operating competitively in common territory, apparently on occasions with the bill being paid to the wrong company as a light interlude. The London Company which supplied Battersea and parts of Lambeth was later absorbed by the Gas Light and Coke Co., giving the North Thames Gas Board a footing across the river. Under the competitive system then in vogue price of gas varied considerably. In 1847 prices ranged between 6s. and 8s. a thousand cubic feet, but by 1949 these had fallen to 6s. Gas in those days was, of course, sold for its lighting and not its heating properties. In those days pit-head price of coal was from 4s. to 5s. per ton, while prices delivered varied from 5s. 6d. at Barnsley to 22s. 4d. at Oxford, and in London from 13s. 11d. to 17s. 6d., of which freight to the Thames accounted for 5s. 6d. A foreman stoker received 30s. and an ordinary stoker 24s. a week of seven twelve-hour shifts. The uneconomic method of laying several sets of mains in the same street, however, came to an end in 1860 when the

Metropolitan Gas Act divided London between the companies, which were subsequently amalgamated into the few with which we are familiar.

The Act of 1860 which abolished competition led to another milestone in the history of the Gas Industry, in the setting up in 1868 of the three Gas Referees who were to be responsible for prescribing the apparatus to be employed and the mode to be adopted for testing the gas for purity and illuminating power. Gas was to be supplied at all times of the day or night that when burned at the rate of five cubic feet an hour in a Sugg No. 1 London Argand burner would be capable of giving a light equal to that of 16 spermaceti candles of six to the pound when each candle burning at the rate of 120 grains of spermaceti an hour. This is rather remote from the recording calorimeter and B.Th.U. per cubic foot with which the present generation is familiar.

The charging and discharging of the horizontal retorts in the primitive gas-making plant of a century ago was a tiring and unpleasant task. It is recorded that "a more fatiguing and dirty occupation than the drawing of hot coke scarce exists in the whole round of manual labour." Doré, in his "London—A Pilgrimage," portrayed a retort house scene which we are here able to reproduce from the *Gas Journal* centenary number. As a contrast he illustrated a brilliant company beneath the new gas lights—the result of the labours of the black squad in the inferno alongside.

Very early, ingenuity was directed to the mechanization of this unpleasant task and many machines were invented that operated with varying success, leading up to the de Brouwer machine



The Doré Print

that will probably remain as long as horizontal retorts are in use.

A further attempt to overcome the unpleasantness associated with the charging and discharging of horizontal retorts led to the introduction of the inclined retort, in which the coal during carbonization was fed by gravity down the retort inclined at about 30 degrees. It was not until the beginning of the present century that the most revolutionary conception—the vertical retort—was finally established. This was developed in both continuous and intermittent forms and has now become by far the commonest type of carbonizing plant in the gas industry. It is a far cry from the early horizontal retorts enveloped in smoke and flame during charging and discharging, to a modern gas works with vertical retorts from which the coke emerges cold, and with the works as a whole, as some of them are, surrounded by gardens of flowers.

This interesting centenary number of

the *Gas Journal* records many important developments of the Gas Industry: the removal of sulphur and other impurities from the gas by lime and iron oxide; the evolution of the Water Gas Plant from 1874 to the present day and the developments of the gas holder to the spiral and waterless gas holders holding many million cubic feet of gas that are now common; the evolution of gas-burners and the coming of the Welsbach incandescent mantle; gas cookers in many forms, gas fires, gas furnaces, gas meters, and the coming of the penny in the slot, and the gas water heater that has become so popular in recent years.

Dust in Industry. Papers read at a conference in Leeds, September 28th-30th, 1948, with discussions. 4to., pp. 163. Society of Chemical Industry, London, £2 4s.

This volume is of first importance to all who are concerned with the problem of controlling or preventing dust and grit in industry and of protection from their effects if they are produced and escape into the atmosphere. The N.S.A.S. can concern itself only with atmospheric pollution as it affects what may be called the public atmosphere: it has neither the resources nor the authority to concern itself with the dusts that are met with inside industry, important though these may be economically or as they affect the health of the workers concerned.

Dust in Industry, nevertheless, contains a great deal that is of direct interest in relation to public atmospheric pollution, and among the 23 papers included in this volume mention may be made in particular of "Problems in the design of plant handling or producing dust," by Gordon Nonhebel (who is a member of our own Executive Council and Technical Committee); "Some practical methods of industrial and atmospheric dust elimination," by J. H. Hellyer and J. C. Cleaves; and "The problem of dust in the chemical industry," by G. Lowrie Fairs and E. Godfrey.

The paper by Hellyer and Cleaves, which deals largely with electrostatic

precipitation, contains a useful summary of the effects of dust on health, which because of its general interest should be quoted in full:

"Most dusts found in free air have no great detrimental effect upon health. This is due to low concentrations and to the protective system provided in the human body against the entry of dust into the microscopic lung cells. This system is graduated, starting with the hairs in the nose, the mucous membrane of the nasal cavities and the ciliated (or waving) epithelia of the main passages. The bulk of the larger particles of dust is caught by this system and removed by coughing, sneezing, etc. The particles which manage to enter the lung cells (generally those of less than 10 microns) are either oxidized by the blood stream or removed by the lymphatic system to lymph nodes where they are permanently deposited. When the rate of dust entering becomes excessive or the material difficult to handle, connective tissue surrounds the particles and fibrosis begins. This gradually robs the air cells of elasticity in size and restricts their ability to function. Continued abuse is cumulative and can result in complete incapacity or death, the time taken to achieve this melancholy sequel depending upon the stamina of the individual."

Other papers relating to health effects deal with forms of dermatitis, silicosis, manganese pneumonitis and arsenical dust in industry.

Approved Coke-Burning Appliances. Abridged Catalogue, 1948. National Federation of Gas Coke Associations, London, £2 2s.

All interested in the installation of domestic smokeless fuel-burning appliances will welcome the 1948 edition of this catalogue of coke-burning appliances. The catalogue contains data concerning appliances that conform to laboratory test methods and performance standards laid down by the Domestic Solid Fuel Appliance Testing

(Concluded page 75)

WHISTON ALFRED BRISTOW



AS briefly mentioned in our last issue, Colonel W. A. Bristow died on March 24th, at the age of 70. He was well-known and well-liked in the smoke abatement movement both for his keen interest in our work and for his great part in having done so much to promote smoke prevention by the low temperature carbonization process. "Coalite" is now a household word, and Colonel Bristow's name, as the untiring pioneer who brought its production to technical and commercial success, will always be associated with it. Without him low temperature carbonization might well have perished as a practical method for the production of free-burning solid smokeless fuel.

W. A. Bristow's interests were at first in flying. He served with distinction in the flying services in the first great war, and in 1918 became Chief Engineer in the Field for both Army and Navy. The Handley-Page

and later the Instone Air Lines were under his direction until he handed them over to Imperial Airways Ltd. in 1924, soon after which he became associated with Low Temperature Carbonization Ltd., and devoted the rest of his life, as Chairman and Managing Director, to the sound development and extension into new fields of that company. Having won a firm public interest in and support for the solid fuel, "Coalite," he proceeded to develop the refining of the liquid products and manufacture of chemicals from them, so that to-day his company occupies a unique and honoured position in the world of coal carbonization.

The smoke abatement movement may have helped to make people feel that "Coalite" was the kind of fuel they ought, as good citizens, to burn in preference to raw coal, but at the same time the existence of "Coalite" made it possible to bring the idealistic appeal down to a practical level. For helping to make this possible Whiston Alfred Bristow will be gratefully remembered.

Approved Coke-Burning Appliances

—concluded.

Panel set up by the Ministry of Fuel and Power. It contains a section of technical data on coke, and sections on open grates, domestic boilers, small central-heating plant and hot water boilers, heating stoves, and on miscellaneous appliances and accessories.

The standards laid down ensure that approved appliances are efficiently designed and soundly constructed and when correctly installed will, when burning coke, give a satisfactory performance. (Our experience leads us to believe that coke-burning grates are not always correctly installed: as a result performance suffers, and some measure of dissatisfaction becomes associated with the appliance.) Most appliances are suitable for anthracite, dry steam coal and hard coke; some, particularly the open fires, will burn bituminous coal.

Correspondence

PRIOR APPROVAL IN SHEFFIELD

*The Editor,
Smokeless Air.*
Sir,

At a recent discussion on this subject, a statement was made that though certain cities and towns had obtained legal powers to carry out this work, an amount of difficulty was being found in putting the schemes into operation; in fact, it was doubtful if "prior approval" could be accomplished with any degree of success.

In the larger cities of Great Britain there is nothing new about this method of controlling the types of fuel-burning appliances which has been carried out for years, but with the Town and Country Planning Act coming into operation, it has become intensified, so that every plan submitted is scrutinised and approved. In Sheffield, since March, 1946, over 800 plans of new and reconstructed premises have been supervised and assistance and advice has been given with regard to suitable fuel-burning appliances.

The fuel shortage, the difficulty in the choice of suitable fuels and the type of appliances, has made the task of mutual decision a difficult one. Tribute must be paid to manufacturers and architects alike who have appreciated what was being attempted and have at times altered their heating plans completely, in order to add their quota to the scheme of smoke prevention. There have been individuals who looked upon this scheme as "unwarrantable interference" which was curtailing the right of the individual to use the type of apparatus and fuel they wanted to, having little or no regard for their neighbours or for amenity.

There have only been nine appeals to the Planning Committee against the decision of the officers and these have been amicably settled, though in certain cases "provisional" relaxation of the Standards has had to be agreed upon.

Arising out of this arrangement of prior approval there are certain features

to which attention can be given. The method of working is explained in this manner.

Every fourteen days a prepared list of plans is submitted from the Planning Officer and where heating of any kind is being installed the plan is examined, if necessary the architect or the owner is interviewed, and the question of fuel availability and the type of appliance is discussed. If no solution is found the plan is marked unsatisfactory and the reason is given. An amended plan is then asked for, which will comply with the Town Planning requirements, having regard to the following factors:—

(a) *Central and Residential Areas.* Gas or electrical heating are asked for, though in certain cases oil-fired central heating has been agreed upon as an alternative.

(b) *Light and Heavy Industrial Areas.* Coal fired appliances with mechanical stokers have not been considered entirely smokeless, but have been freely installed in these areas. For light industry where Lancashire or Economic boilers were required, coking stokers with natural or induced draught are demanded. Sprinkler type with forced draught have only been agreed to for heavy industry. The minimum height for a chimney has been kept at forty feet, but uniformity of height in Sheffield is difficult on account of contours.

(c) *Coke fired appliances.* In this area the price of coke is approximately £1 per ton higher than coal which militates against its use. Coke fired central heating boilers and slow combustion stoves have not been looked upon with favour for it has been proved that where hand-firing is in operation coal, wood and industrial refuse are used, causing much nuisance. This was particularly prevalent during the fuel crisis in 1947 and has continued since, though there is no necessity for it.

In practice, it is found that a coal fired heating boiler, fitted with a

mechanical stoker is preferable to a hand fired coke boiler, as it is not so easy to dispose of undesirable trade refuse in this type of apparatus.

(d) *Personnel*. The need for reliable certificated stokers with a technical knowledge of mechanical appliances has become a necessity since these new conditions have been put into operation.

(e) *National Fuel Policy*. The Ministry of Fuel and Power have not been very helpful in this new project, because the policy of their officers has been to "down-grade" the fuel supplied and this appears to have become more aggravated during the past twelve months, though the fuel shortage is no longer a problem. Recently it has been stated that in future gas and electricity will not be permitted for space heating purposes as it is required for production of goods for export. This policy appears to be somewhat obscure, because "space heating" of premises is equally as important as process heating, and cleanliness in finishing processes is of paramount importance.

At the Cheltenham Conference the Minister of Fuel stated that his Ministry was not prepared to declare a National Fuel Policy and that manufacturers and individuals should be able to choose the type of fuel they desired. In practice it is found that individuals have little or no choice of fuels and Town Planning is rendered very difficult because there is no declared National Fuel Policy.

This difficulty would become clarified to a great extent if a definite policy of fuel allocations was made.

(f) *Prior Approval Legislation*. Over four years ago an amount of useful work was done in drafting new legislation which would enable local authorities to make bye-laws for the prior approval and maintenance of all heating appliances. Though this was approved in principle at the Brighton Conference in 1946, little or nothing has been done to try and put these bye-laws to the Ministry for approval. About 17 local authorities have had clauses approved in private bills, but there is an amount of diversity in these clauses and their method of working. In the meantime,

most of our towns and urban districts are considering or putting into operation schemes of reconstruction and it is noted with regret that many of the heating appliances being installed are not of a smokeless nature. How can we hope for an unpolluted atmosphere or Town and Country Planning that is going to be worth while if little or no attention is paid to the appliances being installed?

In November last the Ministry of Health stated that any domestic heating appliances which would be installed in housing schemes must be of approved design, and this was undoubtedly a step in the right direction. But what of the industrial side of the problem? Why did the Ministry not issue similar instructions for these premises? Making a bold guess, it can be stated that the proposed legislation has never been submitted to them, so that *officially* they do not know of its existence. As an excuse it has been stated that there are no technical officers capable of making decisions with regard to suitable fuel burning appliances. It would appear that the opportunity to approve or disapprove of plans of heating appliances has never occurred because there were no prior approval conditions in operation. Though many difficulties were anticipated the scheme in Sheffield has worked much more smoothly than was thought possible, the most difficult feature being the attitude of the Ministry of Fuel and Power to assist with "graded" fuels and fuels other than solid for space heating.

This letter has been written specially to open up the subject and if possible to obtain from other authorities their experiences and difficulties they have had. It will be of particular interest to the Society and the Technical Committee to have "first-hand" information from other authorities on this problem.

JAMES LAW,
Chief Smoke Inspector.

Sheffield, Rotherham and District
Smoke Abatement Committee.

[The Society's draft Proposals were submitted officially to the Ministry of Health on January 12th, 1948. No reply has been

received. The new local Acts, with the "prior approval" clauses referred to by Mr. Law have made possible a line of advance different from that envisaged in the Society's draft proposals, which were for new bye-laws under the Public Health Act, 1936. Whether or not it is a preferable line is now being studied by the Society's Technical Committee, but one thing required before new national legislation for prior approval can be proposed with real hope of success is, as Mr. Law agrees, evidence on the working of the new local or prototype Acts. The matter will be further discussed in "Progress Reports" at Harrogate, and further contributions to these columns will be welcomed.—Ed.]

SOUTH AFRICA

*The Editor,
Smokeless Air.*

Sir,

We have read with interest the extract from an article by Mr. W. R. Gordon entitled "Darkening Africa." We agree entirely with the author's concern in this matter, but think the article would have carried more weight had he made some reference to modern smokeless mechanical methods of firing boiler plant, instead of stressing the out-dated method of hand-firing.

This firm is busily engaged in manufacturing and equipping quite a large number of boiler plants with smokeless mechanical stokers, both for the Union of South Africa and Rhodesia, and other mechanical stoker manufacturers may be doing likewise. It will be seen, therefore, that in a great many cases, steps are being taken to ensure the smokeless operation of boiler plant in Africa. This smokelessness can quite easily be achieved providing designers and operators of such plant ensure that it is equipped and operated on modern lines.

Our Johannesburg representatives will be only too pleased to assist anyone in trouble with persistent industrial smoke emission.

Yours, etc.,

M. CREIGHTON,

Joint Managing Director,

James Hodgkinson (Salford) Ltd.

London.

FROM CHELTENHAM TO HARROGATE

*The Editor,
Smokeless Air.*

Sir,

The announcement that our next annual meeting will be held at Harrogate, following last year's at Cheltenham, reminds me of my interesting experience when I had to leave the Cheltenham conference and travel by road to another conference at Harrogate.

I left my hotel early on the Saturday morning, in brilliant sunshine, with every prospect of a complete day of cloudless blue sky. The journey through Broadway, Stratford-on-Avon, Warwick and Kenilworth was one long delight. Then I came to Coventry. The moment I entered the outskirts the sun disappeared behind a smoke haze, which lasted right through the town. As soon as I reached the other side of Coventry the sun reappeared in a lovely blue sky. This lasted until I reached six miles from the centre of Leicester, where the sun departed again behind a smoke haze, which lasted all the way through the town for exactly twelve miles, the sun breaking out again exactly when I passed the "six miles to Leicester" milestone. All along the Fosse Way and through Newark I had sunshine and blue skies again. As I entered Doncaster the sun became dimmer, but did not quite disappear, probably because it was Saturday afternoon, everybody was on the way to the football ground, and the smoke was less intense. Nevertheless, it was not till I reached Harrogate that I began to see a clear sun in a blue sky again!

Yours, etc.,

LESLIE HARDERN,

Public Relations Officer,
North Thames Gas Board.

London.

"Smokeless Home Pages," written from the housewife's viewpoint, will be a new regular feature of SMOKELESS AIR, starting in the Autumn issue to be published in September.

Three Conferences

GLASGOW — NOTTINGHAM — WALSALL

THE SCOTTISH DIVISION

THE Scottish Division of the Society held its annual conference in Glasgow on April 22nd. It was attended by representatives of local authorities and other bodies and was accorded a civic welcome and hospitality by the Lord Provost (Sir Hector McNeill) and Town Council. The morning session took an interesting form, in which an opening address on the smoke problem from the housewife's point of view was given by Councillor Mrs. Roberts of Glasgow. Her contribution was personal, outspoken, and full of good Scots sense. She criticized especially the steamship smoke on the Firth of Clyde, that "great international beauty spot," and declared that the majority of local authorities were only playing with smoke abatement.

Mrs. Roberts' address included a long series of questions about domestic heating, smokeless fuels, and so on, which were duly answered by a strong panel of experts who were given possession of the platform. They represented the gas, electricity, and coal industries and the manufacturers of domestic appliances. The only difficulty arising from this novel and illuminating form of programme was that so many of the questions asked by both Mrs. Roberts and finally by the audience itself, tended to demand more discussion than was possible in the time. Altogether, however, a session that could well be repeated.

In the afternoon, after the excellent lunch included as part of the conference arrangements, the members and delegates boarded buses for a visit to the works of Messrs. Babcock and Wilcox at Renfrew. There they saw many stages in the creation of this firm's famous boilers and other plant.

THE NEW EAST MIDLANDS DIVISION

About seventy members and representatives from the East Midlands Division of the Society attended a meeting at Nottingham on April 7th to consider the formation of an East Midlands Divisional Council. The meeting was presided over by the Lord Mayor of Nottingham, followed by Alderman Purser, Chairman of the Nottingham Public Health Committee, and among the speakers were Mr. Charles Gandy and Mr. J. W. Beaumont, Chairman and Vice-Chairman of the National Executive Council. There was a keen and occasionally critical discussion by the delegates, some of whom had come from places as far away as Yarmouth and Ipswich. It was resolved to set up the Divisional Council, and Mr. Alfred Wade, Chief Sanitary Inspector of Nottingham, was elected Honorary Secretary. A provisional Committee to draft a constitution was appointed and a further meeting of members will be held in the near future.

MIDLANDS COUNCIL AT WALSALL

The Midlands Joint Advisory Council for the Abatement of Smoke and Atmospheric Pollution (to give the full and somewhat ambiguous title) held a successful conference at Walsall on March 3rd. This is a "Regional Committee" of local authorities, and although a member of the Society is not a constituent section of it. Newcomers to the movement often find it difficult to follow these distinctions.

Two papers were read, one by C. A. Stansbury, Chief Sanitary Inspector of Walsall, on "Education and Publicity in Relation to Atmospheric Pollution and Smoke Abatement," and the other on "Smoke Abatement in Walsall: a



Deposit gauge inspection appears to be becoming popular. Above: at the Walsall meeting. Opposite: the Society's Divisional Council at Leeds

Review of Local Practice and Procedure" by E. Bayley, Smoke and Factories Inspector.

Mr. Stansbury had some thoughtful and encouraging things to say about the smoke abatement movement:

"As one who has been interested in this work for the past twenty years, I cannot help but be amazed at the great change which has taken place in that time in official and public recognition of the evils attaching to atmospheric pollution. The progress since 1945 in this respect has been spectacular and no doubt the economic factors involved have had a great effect. The Government have shown their sympathy and interest, and an important factor has been the linking of the Department of Scientific and Industrial Research Atmospheric Pollution Division with the Fuel Research Station at Greenwich. It has been more widely acknowledged that, in the past, the nation has been extremely wasteful of its fuel resources, particularly in the burning of raw coal, and the emphasis now is on fuel efficiency. The work of the Ministry of Fuel and Power in this respect is of high merit and deserving all the support that can be given to it.

"The pioneering work of the National Smoke Abatement Society

must also be acknowledged. The efforts the Society has made to mould public opinion in spite of many disappointments and slender resources is deserving of the highest praise."

About the Society Mr. Stansbury also said: "It is disappointing to find that, although the Midlands Joint Advisory Council has some forty-seven local authorities represented, only twenty-nine are members of the National Smoke Abatement Society, a Society which has done so much in the educational and publicity fields, and could do a lot more if fully supported by local authorities and other interested parties. No local authority, whether urban or rural in character, can claim to be unaffected by atmospheric pollution."

References to local government officers and to architects can also be quoted:

"Officers charged with the enforcement of public health legislation must be keen and interested in the work. They must have an atmospheric pollution consciousness and seize on every opportunity, however small, to produce conditions which will improve the state of the atmosphere. They must have diplomacy, tact, and infinite patience. I know of no phases of public health work where these qualities are more called for. One cannot achieve spectacular results quickly. It is very much a long-term policy, and one must not be disappointed at lack of progress. In these days not only Public Health Officers are involved, but Surveyors, Architects, Educationalists, Planning Officers, etc., all have their part to play and can each make a contribution.

"There is a big field for educational and publicity work among architects, particularly as to the necessity for the attainment of good atmospheric conditions. Sufficient information is now available as to the best types of domestic appliances, and there is also a tremendous amount of technical information available as to heating, industrial boiler, and furnace plants, etc., which can operate with the minimum of nuisance and with the fullest efficiency. Archi-

pects will render a good service to the community if they will use every opportunity to have the best and most efficient types of equipment provided in the buildings they design."

Practical Work in Walsall

Mr. Bayley's paper was a full and practical survey of the excellent work being done to reduce smoke in Walsall, from which we extract some paragraphs of especial interest :

"Complaints, irrespective of their source, are of course, investigated in the orthodox manner. . . . It may be of interest, however, to describe a form of practical work which has already proved its worth in Walsall. Shortage of technical staff unfortunately still severely limits its practical use. By arrangement with the firm concerned, investigations extending over a continuous working period of six hours are carried out at the premises on each of two consecutive days. The time chosen for the tests are those on which the heaviest steam loads are expected. On the first day the boiler plant is operated by the fireman in accordance with his normal practice, any errors of technique on his part being noted but not commented upon. Notes are made of the times of firing, amounts of fuel applied, quantity of water evaporated, controls used, etc. ; simultaneously an observation is made of the density and duration of smoke emitted from the chimney stack. The records of both tests are entered on specially prepared graph paper for comparison at the end of the experiments. The same procedure is followed on the second day, except that practical suggestions for reducing smoke are made to the stoker from time to time. This method, of which both managers and stokers are appreciative, readily demonstrates the extent to which unscientific stoking is responsible for smoke nuisances. It will be appreciated, of course, that a test of the type described requires the services of two or more Sanitary Inspectors, depending on the number of boilers in use on the premises. In Walsall, such an investigation is possible only because of the ready co-operation



of other members of the inspectorial staff."

Although Walsall has as yet no statutory powers for prior approval, there is liaison between the Borough Surveyor and the Chief Sanitary Inspector, by which the Building Inspectors refer to the Sanitary Inspectors, for comment, copies of plans of new industrial and commercial buildings. "If a proposed fuel-burning appliance or industrial process is likely to cause smoke or other nuisance, a report to this effect is made to the Borough Surveyor for submission to the appropriate committee when the plan is considered. Direct representations are also made by the Department to the firm concerned, urging them to modify the apparatus so as to reduce the possibility of nuisance arising from its operation. This interdepartmental alliance has already enabled several potential offenders to be satisfactorily controlled."

The action taken at Walsall in response to the N.S.A.S. National Survey of the Sources of Atmospheric Pollution was particularly valuable, as recorded by Mr. Bayley, and shows how much more complete and important the Survey returns would have been if all local authorities had displayed similar interest :

(Concluded on next page)



From Our Photo Library—2

W. J. Bell

Snowdon Scene

*“Oh, solitude! where are the charms
That sages have seen in thy face?”*

—Cowper.

Walsall Conference—*concluded*

“A study of the documents issued by the National Smoke Abatement Society in connection with the recent survey, revealed that departmental records would supply only a limited proportion of the information asked for (approximately 170 out of 850 affected premises). It was clearly impracticable, in view of the staff position, to visit all the remaining premises to elicit the detailed information required. An appeal by the Chief Sanitary Inspector to the members of the Chamber of Commerce secured a promise from industrialists to co-operate, by supplying the information on a questionnaire to be drawn up and issued by this department. A modified, and somewhat simplified, version of Section A of Part II of the Society's questionnaire was devised.

This was circulated to some 680 non-domestic users of fuel. About 580 replies were received, nearly 500 of the forms being returned fully completed; the remaining 80 forms, which were sent in uncompleted, related mainly to businesses which had been closed down or transferred to other premises. Rather more than 100 questionnaires failed to return to base! The information contained in the completed documents was subsequently analysed and formed the basis of our answers to the inquiries set out in the Smoke Abatement Society's questionnaire.”

Apart from the value of this survey within a survey, the results obtained—580 replies out of 680—were truly remarkable, and much higher, proportionately, than the Society received from local authorities themselves. Good work, Walsall!

Railway Electrification

THE MANCHESTER—SHEFFIELD LINE

**From an Address by George Dow, Press Relations Officer,
British Railways (Eastern and North Eastern Regions),
to the Rotary Club of Ashton-under-Lyne.**

LAST Christmas the railway through Ashton-under-Lyne attained the ripe old age of 103 years, for it was on December 23rd, 1845, that the Guide Bridge-Stalybridge branch of the Sheffield, Ashton-under-Lyne and Manchester Railway was first opened to public traffic. The main line of this railway, which had been previously opened in stages eastwards from Manchester (London Road) to Woodhead, and westwards from Sheffield (Bridgehouses) to Dunford Bridge, together with a branch to Glossop, was opened to the public on the same day, the last link between Woodhead and Dunford Bridge, the Woodhead tunnel, having been completed.

The Sheffield, Ashton-under-Lyne and Manchester Railway subsequently became a constituent company of the Manchester, Sheffield and Lincolnshire Railway, which changed its name to Great Central in 1897. The lines of the Great Central in turn became part of the L.N.E.R., and now, under nationalization, form an integral part of the Eastern Region of British Railways.

The Manchester-Sheffield main line is one of the most difficult to operate in the country. It has very heavy gradients and near its summit the Pennine ridge is pierced by the Woodhead twin tunnels, which are more than three miles long and the fourth longest tunnels in Great Britain.

Over this route an extremely dense traffic has to be worked, about six out of every ten trains conveying coal. Nearly 100 trains daily each way pass through the Woodhead tunnels. These tunnels are difficult to ventilate adequately and the smoke and fumes have always been troublesome to enginemen

and destructive to the tunnel linings and rails. It was once truly said that the Woodhead tunnels have an odour all of their own, which could be approached by drinking one of the cheaper varieties of port!

In 1936 the directors of the L.N.E.R. announced their plans for electrifying the Manchester-Sheffield line, together with certain branches, including that to Wath via Worsborough Dale. Their decision was influenced by the heavy traffic, the exceptional geographical features of the route and its favourable position in regard to power supply. It was estimated that electrification would increase the capacity of the Woodhead tunnels by at least 25 per cent., whilst the rails in the tunnels would have a much longer life. At present, owing to the atmospheric conditions, the life of the standard 95 lb. rails is about 3-3½ years as compared with a normal life of 15-17 years in the open, under average traffic conditions.

Preliminary work on this project was well in hand before the war, when it had to be suspended, and was resumed in the late summer of 1947. The following lines are now being electrified, covering 75 miles of route and a total of 330 miles of track:

- (1) Manchester (London Road) to Sheffield and Woodhouse (Rotherwood sidings).
- (2) Penistone (Barnsley Junction) to Wath via Worsborough.
- (3) Glossop branch.
- (4) Stalybridge branch as far as Dukinfield.
- (5) Oldham, Ashton and Guide Bridge branch up to and including Ashton Moss sidings.



L.N.E.R. Electric Locomotive No. 6000 in use in Holland

- (6) Fairfield to Manchester (Central) and Trafford Park sidings.
- (7) Ashburys to Ardwick goods yard and Midland Junction.

The overhead line conductor system, using direct current at 1,500 volts, which is the higher voltage standard system authorised by the Ministry of Transport, will be employed. This system is similar to that in use on the Manchester-Altrincham line for the past eighteen years, and in London is now being installed on the main and suburban lines from Liverpool Street and Fenchurch Street to Shenfield.

When the job is finished practically all classes of passenger, goods and mineral trains will be worked by electric traction and steam locomotives will therefore generally be confined to shunting duties in marshalling yards and sidings.

The local passenger services between Manchester (London Road) and Hadfield and Glossop will be provided by eight 3-coach multiple unit trains of the open saloon type with first and third class accommodation and the train

mileage will be increased by some 48,000 per annum. Other train services and banking duties will be performed by a fleet of eighty-five electric locomotives capable of a speed of 65 m.p.h., which is the maximum permissible over the lines being electrified. An interesting feature of 27 of these locomotives will be an electrically heated steam boiler to provide steam heating when hauling passenger trains.

New sheds for both steam and electric locomotives at Darnall, a small electric locomotive shed at Wath, and a large electric running and repair depot at Reddish are being built, the steam locomotive shed at Darnall having been completed and brought into use in April, 1943. At Sheffield also the track layout in the vicinity of Victoria Station will be improved and No. 3 signal box there will be transferred to a site east of the Wicker Bridge.

The existing method of signalling on the lines to be electrified will continue, except that electric colour light signals

(Concluded, page 86)

Manchester's Code for Prior Approval

THE Report on the Health of the City of Manchester for 1947, published last autumn, contains in its smoke abatement section a first survey of the operation of the smoke clauses (section 36) of the Manchester Corporation Act, 1946. These, it may be recalled, require all fuel-burning furnaces for steam raising or any manufacturing purpose to be "so far as practicable capable of being operated continuously without emitting smoke," and provide for the submission of plans and proposals relating to new furnace installations. Although such submission is not compulsory approval exempts the applicant from action under the preceding clause, and during the year a number of plans and proposals were received and notices of approval were issued.

"The number of formal applications for approval was relatively small," states the Report, "and may be attributable in part to the difficult supply position as to boilers and appliances. . . . As prior notification of the installation of furnaces is not required under the Act, it is possible that some industrialists may have installed furnaces without the knowledge of the department, especially when the furnace concerned was a replacement in an existing building."

To assist in the working of the prior approval procedure a panel of Corporation officers with specialized knowledge in fuel technology, engineering and smoke abatement has been set up to consider the technical and economic problems connected with the submission of plans and proposals. Several meetings of the panel were held and a code of requirements for steam raising furnaces was formulated to facilitate the consideration of plans and proposals and to assist industrialists who seek

advice on constructional features of proposed installations to secure conformity with the purpose of section 36 of the Act. This code, the first of its kind (as far as is known) in this country, will be of particular interest and is reproduced in full below.

STEAM RAISING FURNACES— CODE OF REQUIREMENTS

1. NATURE OF BUSINESS, ETC.

2. MAKE AND TYPE OF BOILER

(a) *Evaporative Capacity*.—The boiler shall be of sufficient size to meet an evaporation of 20 per cent. in excess of the maximum demand for steam.

(b) *Grate Areas*.—Shall be sufficient to give the necessary evaporative power to meet the demand without forcing.

(c) *Areas of Heating Surfaces*.—The ratio of boiler heating surface to grate area shall be sufficiently high to give the required evaporative power to meet the maximum steam load.

(d) *Working Pressure*.—To be stated in all cases.

(e) *Distance between Grate and nearest water-cooled surface*.—With externally fired boilers shall be sufficient to produce efficient combustion of the volatiles in the fuel.

3. FUEL AND METHODS OF FIRING

Bituminous Coal

All boilers shall be mechanically fired, subject to modification to meet emergency conditions.

Smokeless (solid)

Anthracite

Creosote Pitch

The C/P burning installations to comply with Ministry of Fuel and Power, Fuel Efficiency Bulletin No. 36.

Oil

Oil burning installations to comply with the Codes of Oil Burning Equipment specified by the British Standards Institute and/or the Ministry of Fuel and Power Efficiency Bulletin No. 24.

4. DRAUGHT

Shall be adequate to meet maximum rates of combustion for varying types of fuel and in accordance with the recommended specifications in the Ministry of

Fuel and Power publication, *The Efficient Use of Fuel*.

Draught gauges to be fitted to all furnaces.

Provision of secondary air to furnace.—Where necessary shall be adequate and controllable to meet the varying rates of combustion.

Provision of air to boiler-house.—Provision shall be made for continuous and adequate air admission to the boiler-house to support complete combustion, and wherever practicable the air supply shall be direct from the external air.

5. FEED WATER

Automatic feed is desirable to obviate the necessity of forcing the boiler due to the introduction of a large volume of relatively cold feed water.

A feed water meter of recording type to be installed with all boiler plant. (Not applicable when smokeless fuel is used).

6. FLUES, CHIMNEYS. SIZE, ETC. AND POSITION

The required dimensions and construction shall conform with recognised formulæ and general combustion engineering practice.

The flues shall be as far as possible straight and direct to chimney base. Any changes in alignment shall be curved and no sharp angles shall be permitted. Adequate provision shall be made for inspection, testing and cleaning purposes. No other connection shall be made to any chimney or flue which will reduce the draught below that for efficient combustion.

In the case of brick set shell type boilers, provision is to be made to prevent short-circuiting of flue gases due to the expansion and contraction of the boiler shell.

Nature of Damper Control.—All dampers shall be of the "Sealed type" to exclude all air leakage and shall be capable of operation from the firing floor.

Smoke Indicators.—Unless the top of the chimney is easily visible from the boiler house, mirrors, smoke indicators or similar devices to be provided.

7. GRIT EMISSION

Provision to be made to prevent the emission of soot, ash or grit from installations in which the intensity of draught and the type of fuel used render such provision necessary.

Further comments from the Report may be quoted: "It will be observed that reference is made in the code to the use of bituminous coal as fuel. It was recognized that this type of fuel will, of necessity, be used for economic reasons,

in many types of steam-raising furnaces. Reference may be made in this connection to the Simon Report, which recommends the use of bituminous fuel in suitable furnaces so as to allow the limited supply of smokeless fuels to be used in domestic installations.

"In requiring the provision of mechanical stokers where bituminous coal is used, it was felt that these appliances are essential to the prevention of smoke emission which inevitably occurs with hand firing at irregular intervals. Mechanical firing considerably lessens the necessity to open the firedoors and the predetermined feeding of small quantities of fuel maintains a high uniform furnace temperature, and when properly installed and controlled it assures efficient conditions of combustion.

"Industrialists have displayed a marked degree of co-operation in meeting the requirements of the Corporation at a period of exceptional difficulty and with a return to normal conditions of adequacy in supplies of appliances and suitable types of fuel it is anticipated that the provisions of section 36 will be more widely appreciated as a contribution to industrial efficiency."

Railway Electrification—concluded.

will replace all "distant" semaphore signals. Distant signals are also to be repositioned so as to ensure a braking length of 1,200 yards between them and the appropriate home signals on falling gradients. Some existing signals will have to be repositioned owing to the erection of the structures carrying the overhead wires.

New Tunnels

Associated with the electrification scheme are the boring of a new double line tunnel at Woodhead and a new single line tunnel at Thurgoland. The first is a task of great magnitude, costing over 2½ million pounds, but it will daunt the civil engineering staffs of British Railways no more than its predecessors daunted the Victorian engineers of a century ago.

SMOKE PREVENTION ABSTRACTS

94. Some Advances in Domestic Solid Fuel Appliances, Chamberlain, E. A. C., *Coke and Gas*, **11**, 119, April, 1949. Surveys the previous lack of progress in domestic solid fuel appliances, the general post-war problem and the influence of the Simon Report, and details the requirements in modern appliances. Five kinds of such appliances are then considered: space-heaters, with boiler, multiple duty unit, free-standing cooker with boiler, open closed stove with boiler, and improved open fire. The author states that many provincial gas undertakings do not regard gas coke as a fuel suitable for domestic use and make no attempt to provide graded coke for open coke fires. Some members of the gas industry still talk of unhealthy fumes from coke fires and it is not surprising that large numbers of the general public will not burn coke for this reason. There is also a fallacy that coke has a deleterious effect on copper boilers. These two prejudices must be broken down and a national fuel policy must be formulated on this subject as it is practically impossible to devise some types of appliance to burn bituminous coal or coke with equal efficiency.

95. Air Pollution in U.S.A., Sutton, O. G., *Weather*, **4**, 5, May, 1949. Report of a talk on Micrometeorology in America by Prof. Sutton on his return from a recent lecture tour. On atmospheric pollution American interest was considerable. At Donora he had been deeply moved by the complete absence of vegetation on undisturbed ground at the bottom of the valley, although there was plenty of green growth higher up the slopes. In Los Angeles a method of forecasting fog by plotting the height of the 700 millibar level above or below the normal, had been developed.

96. Town's Gas in Potteries, Stanier, J. E., *Times Review of Industry*, April, 1949. Reviews the progress in the use of gas, since it was

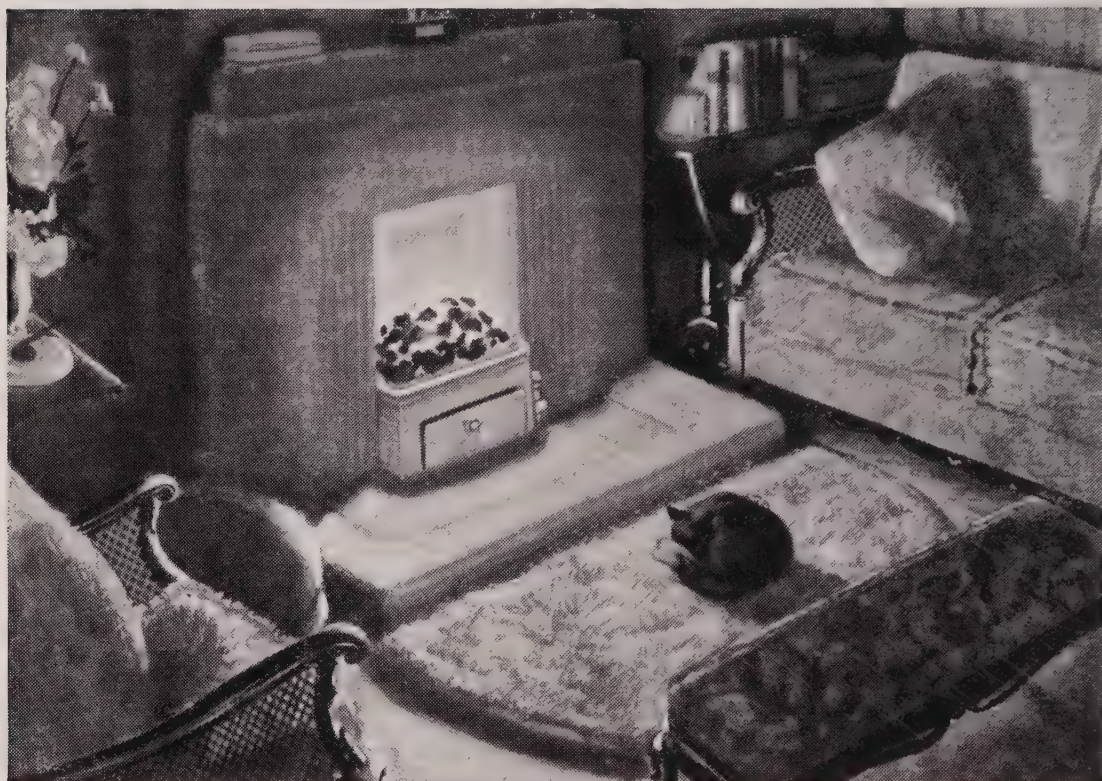
first applied in 1932, for ceramic firing. Although the first installation was successful others at first followed only slowly, but in recent years there had been a phenomenal increase in the rate at which kilns of this type have been built. The adoption of gas was likely to lead in the near future to the disappearance of the coal-fired beehive oven. A short account of the three main types of gas kiln is given. At present there are nearly 150 gas kilns and furnaces in operation in the Potteries, with an annual consumption of 3,000 million cubic feet, compared with 7.4 million cubic feet in 1932. The gas kiln has recently been successfully adapted to the sanitary section of the industry.

97. The Restless Wind, Sutton, O. G., *Science News No. 11*, Penguin Books Ltd. An account of atmospheric turbulence and its importance in meteorology as the main agent for the dispersion of smoke and other atmospheric pollution. Accounts are given of the Meuse Valley disaster of 1930, and of the problems arising from sulphur dioxide emissions at the lead and zinc smelting plant at Trail, British Columbia, with a description of the control method used at Trail for estimating wind and turbulence so that emission of the fumes can be reduced when the degree of turbulence is below a recommended minimum.

98. Fuel from Sewage, *Science News No. 11*, Penguin Books Ltd. An article on "Introduction to Sewage" includes references to the yield at Mogden, Middlesex, of over a million cubic feet of gas a day from the digestion of surplus sludge. The gas contains 70 per cent. methane and 30 per cent. carbon dioxide, and is used at the works for heating, for providing the power for nearly all the pumping machinery and for driving the "factory's" vehicles. It is estimated that in 11 years this has saved the importation of nearly 13 million gallons of fuel oil.

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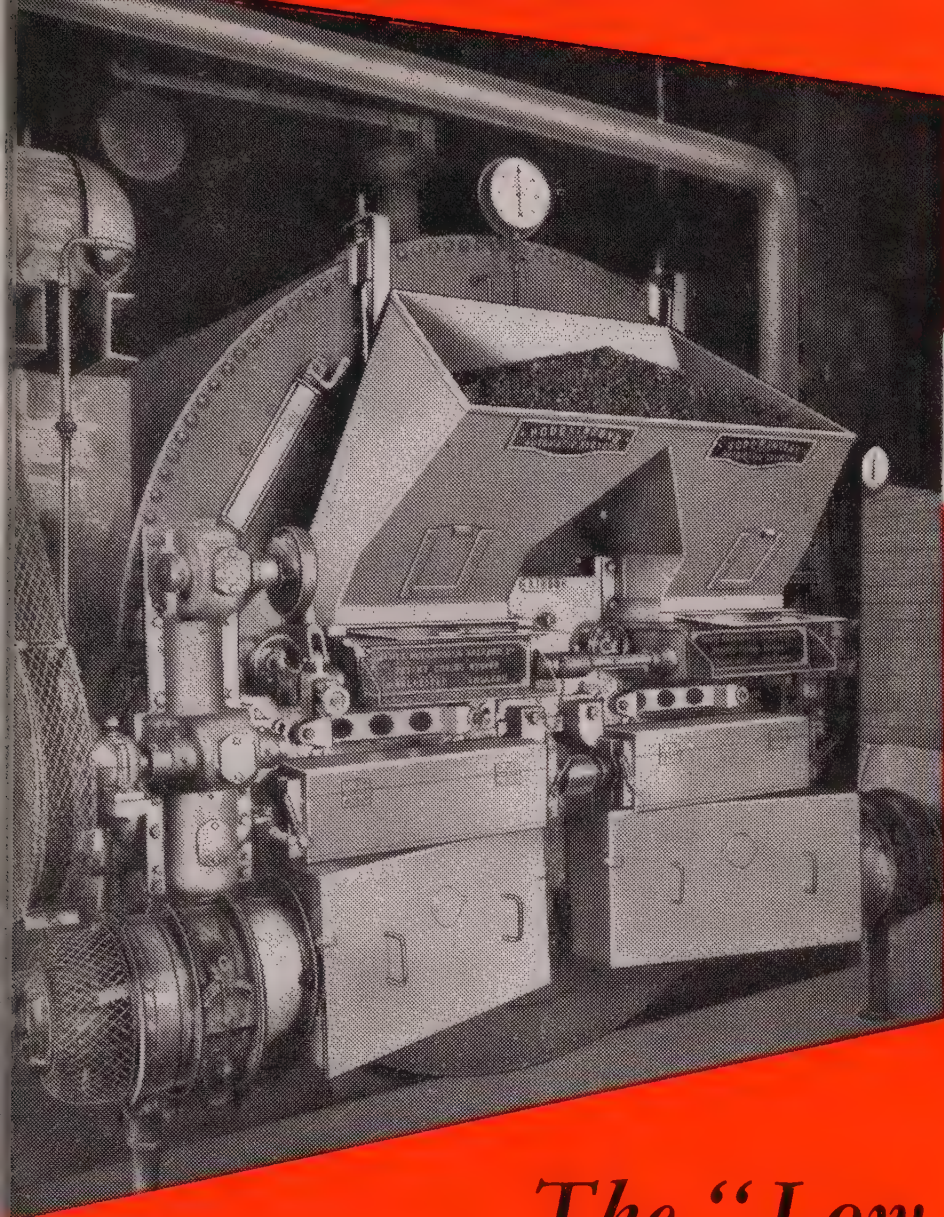
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